APR 26 1944

PAPER TRADE JOURNAL

APRIL 20, 1944

"Time and the hour run through the roughest day" *

The storm of war is not yet cleared, but the sun of peace will soon cast its time shadow on the dial of new production schedules. • Post-war plans can no longer be put off. Right now they should be ready to put into effect.

Are you ready to revamp your factory layout, to set up new production lines, to put new and perhaps stern emphasis on economy in the use of space, machinery, manpower, intra-mural and external transportation and in the flexible or concentrated application of power?

These and a host of other important considerations confront not only those establishments which have been speeded up to the intensity of war production, but those which have suffered in the undernourished civilian fields. • The time for change impends and this change is permeated with engineering problems which call for experience and resourcefulness on the part of the Engineer you retain to counsel, design and direct.

Engineers for more than 40 years **J. E. SIRRINE & CO.**

Greenville • South Carolina

A Departmentalized Engineering Organization Serving World-Wide Industry

DOWNINGTOWN ★ ★ ★

WARTIME USES OF OUR FACILITIES & EXPERIENCE

U. S. Maritime Commission Photo

ANCHORS AWEIGH *for a* ZIG-ZAG COURSE *with* "OUR BUILT" *Windlasses and Steering Gears*

A great many tankers of the U. S. Maritime Commission are equipped with Downingtown-Built Windlasses and Steering Gears. The Windlasses are used for handling the 6-ton anchors on these ships, while the Steering Gears control the ships through the many hazards of wartime voyages . . . American shipyards delivered about 70% more tankers in the first seven months of 1943 than in all of 1942. Mass production and "pre-fabrication" (that's our part) plus the all-out effort of workers and management (that's our part, too) have cut the average production time of the 16,000 ton ships in half, from their previous schedule of 100 days. . . . The urgency of sturdy, careful workmanship in these machines is self-evident. We are glad that our facilities and experience in building paper mill machinery adapts us for this war work and we believe this war work is teaching us a few things that will be useful later in building paper mill machinery. . . . The Downingtown Manufacturing Co., Downingtown, Pa.

Official U. S. Navy Photograph

PAPER
TRADE JOURNAL

Established 1872

Title Reg. U. S. Pat. Off.

Volume 118 Number 16

Published every Thursday by Lockwood Trade Journal Co., Inc.

Executive and Editorial Offices: 15 W. 47th St., New York 19, N. Y.

New York, United States of America

BRyant 9-0860

GEO. S. MACDONALD
President

ARTHUR E. GORDON
Executive Vice-Pres.

JOSEPH P. HORGAN
Secretary

GEO. E. LOCKWOOD
Treasurer

Western Representative:

H. K. VINTON
123 West Madison St., Chicago, Ill.

HENRY J. BERGER
Editor

STILLMAN TAYLOR
Associate Editor

R. G. MACDONALD
"TAPPI" Editor

LYNN M. LAMM
Washington Correspondent

Subscriptions
(Payable in advance)

By the year $4.00
Single Copy ..... 10 cents

Postage Extra:
To Canada $2.00
To Other Foreign Countries $3.50

Member Audit Bureau of Circulations

PAPER *established Feb 17, 1899, combined with* PAPER TRADE JOURNAL *Nov. 16, 1899.* PAPER *established Sept. 21, 1910, combined with* PAPER TRADE JOURNAL, *Feb. 19, 1925.* *All rights to the above titles reserved.*

PAPER TRADE JOURNAL *is entered as Second Class matter at the Post Office at East Stroudsburg, Pa., under Act of Congress of March 3, 1879. Publication Office of Lockwood Trade Journal Co., Inc., 34 N. Crystal St., East Stroudsburg, Pa. Printed in U. S. A.*

Copyright 1944 by the Lockwood Trade Journal Company, Inc. The contents of PAPER TRADE JOURNAL *including all articles, illustrations, etc., are covered by copyright and may not be reprinted except by permission.*

CONTENTS

APRIL 20, 1944

	PAGE
Charge Waxed Paper Men with Price Fixing	11
Paper Plastic Items Are Commended by Army	12
Mill Workers Favor A.F.L. Union	12
Will Establish "Tree Farms"	12
Urges Survey to Provide Employment	13
Michigan Superintendents Meet	13
Paper Production for February	13
Allows More Mill Repairs	13
Ansul Chemical Co. Opens Office	13
Much Paper Now Delivered on End-Use Basis	14
Must Report Basic Weight Changes	14
Butterworth Post-War Plan	16
Interprets Container Board Order	16
M. E. Clark Returns to Wyandotte	16
L. C. Currier Made Mill Manager	16
Taggart Starts Engineering Dept.	16
Financial News	18
St. Regis Elects Directors	18
T. E. Hollingsworth Goes with WPB	18
TAPPI Empire State Groups Meet	20
Editorial	26
Hummel-Ross Profits Up	27
Production Ratio Report	27
Latest Market Review	40
Miscellaneous Markets	42
Market Quotations	42
Classified Advertising	48

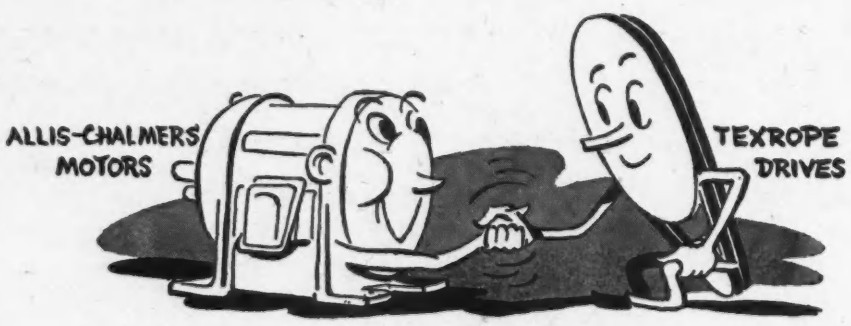
Technical Section *("TAPPI")*

Stain Reaction of Unbleached and Bleached Groundwood Pulps	29
Fundamental Research on Tall Oil and Sulphate Turpentine and Commercial Exploitation of Results	30
New TAPPI Members	34
Limits of Effect of Acid Concentration-Digester Pressure Relation in Sulphite Pulping	35

PAPER TRADE JOURNAL IS INDEXED IN INDUSTRIAL ARTS INDEX

INDEX TO ADVERTISERS ON PAGE 54

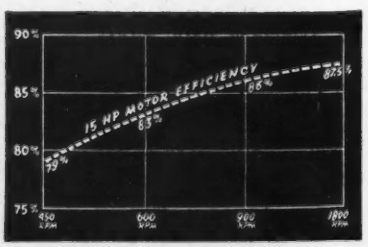
A-C "Team" Flexibility



★ To drive low speed machinery with high speed motors (now that low speed motors are sharply restricted), Allis-Chalmers Texrope Drives can "gear down" motor speeds over a range of 7 to 1. As America's only builder of *both* motors and V-belt drives, Allis-Chalmers has long studied and advocated their use in proper com-

1 In most applications, an 1800 rpm motor with Texrope Drive will ably do the job of a lower-speed, direct-connected motor —at lower cost in money *and materials!*

2 When you buy an 1800 rpm instead of 450 rpm 15 hp squirrel-cage motor, for example, 600 lb are saved. And *you* save well over $200 — with drive figured in!



3 Note that efficiency rises from 79% for the 450 rpm motor to 87.5% for the 1800 rpm motor. The 1800 rpm motor saves you over 30 kw/24 hr. day.

A-C WE WORK FOR VICTORY WE PLAN FOR PEACE

ALLIS-

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Vol. 118, No. 16 Thursday, April 20, 1944 Price Ten Cents

Charge Waxed Paper Men With Price Fixing

Allege American Waxed Paper Association and Twenty-Four Members Engaged In Combination To Restrict Trade In Interstate Commerce — Other Concerns Also Are Mentioned In The Complaint.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 19, 1944—American Waxed Paper Association, 1532 Lincoln-Liberty Building, Philadelphia, and its 24 member manufacturers are charged in a complaint issued by the Federal Trade Commission with engaging in a combination and conspiracy to restrain trade and fix prices in the interstate sale and distribution of waxed paper and waxed paper products. The complaint also is directed against the members of the Association's board of governors and its manager and secretary-treasurer, George J. Lincoln, Jr.

Acting in cooperation with each other and through their trade association and its officers, the respondent manufacturers allegedly fix and maintain minimum prices and identical delivered prices, as well as uniform discounts and terms of sale for the various types of waxed paper sold and distributed by them.

U. S. Divided Into Price Zones

The respondent manufacturers, the complaint charges, have, by agreement, divided the United States into price zones, with Zone No. 1 as the base and with stated differentials for the other zones. This zoning system, it is alleged, is operated by the respondents in such a manner that the delivered price of each of their products is the same to all purchasers located in each respective zone regardless of their location in the particular zone and regardless of the location of the particular manufacturer making the sale.

In order to maintain their zoning plan of identical delivered prices, the respondent manufacturers, the complaint charges, "systematically and habitually" discriminate in price among their respective customers, regardless of the differing costs of delivering their products to purchasers. Such discrimination, the complaint continues, consists "of systematically charging and collecting from purchasers located nearer freightwise to the plants of the respective respondent manufacturers, higher amounts per unit of product than from purchasers located farther freightwise from such plants, after making due allowance for differences in costs of delivery. Such discrimination is inherent in respondents' planned or prearranged common course of action with reference to said zoning system of identical delivered prices."

Other Practices Alleged

In furtherance of and pursuant to their agreements and combination, the respondents allegedly have engaged in other practices, including the following.

(1) The manufacturers generally have adopted and used rules and regulations, compiled and promulgated by the association, which deal with the allocation and classification of grades, quotations and sales and other so-called trade customs, including a pricing guide containing a map which divides the United States into the zones used to establish price differentials.

(2) The manufacturers have filed with the association copies of invoices and price lists, and agreed that they would not change or deviate from such lists until they submitted new and different prices; and agreed that the Association could, and it did, disseminate to its members the price information so filed.

(3) The manufacturers have furnished the association with lists of bakers under contract with them to purchase various types of bread wrappers; and the association from time to time has issued "Official Codes of Roll Wrappers" which the manufacturers abided by in determining the prices at which they would sell bread wrappers to bakeries.

(4) The association, at the direction of its board of governors, has from time to time purchased the manufacturing equipment of bankrupt concerns and has resold it to its membership for the purpose of preventing its use by competitors and so that any further production of waxed paper by the use of such equipment would be subject to the price-fixing and restraint-of-trade agreements entered into by the respondents.

(5) The association has maintained compliance by the manufacturers with the various rules, trade

(Continued on page 24)

Paper Plastic Items Are Commended By Army

Products of Consolidated Water Power & Paper Co. and Kimberly-Clark Corp. Found of Great Value In Aiding War Effort—Storage of Water Is Low — Mill Workers Favor A.F.L. — Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 17, 1944—"Advantages of Bonded Paper Sheets as an Aircraft Material" are discussed in detail in an article by that title in the March 15 issue of "Aero Digest." The writer, Franklin M. Reck, Detroit editor of that publication, made a study of the plastics plant of the Consolidated Water Power and Paper Company at Wisconsin Rapids, Wis., because of the important part that the company is taking in the utilization of paper in airplane structural work.

Mr. Reck's article concerns Consoweld, which resulted from a request by the Army Air Force about two years ago to the United States Forest Products Laboratory at Madison, Wis., to determine which companies were making the strongest paper. The Laboratory suggested Consolidated, and Consoweld was evolved as the result of a cooperative effort between the two. The plastics division was then organized, and a complete new plant was built with presses up to 84 by 192.

The writer points out that Consoweld is paper treated with phenolic resin and formed into a panel under heat pressure, and that "sandwich" material is made by using a panel of wood between layers of Consoweld, bonding them in a press. The material is meeting a growing demand in construction of gliders and powered planes.

"Everything we manufacture is for vital parts in airplanes," said Burt Williams, Consolidated promotional director, in reference to the plastics division and the 'Aero Digest' article. The Army airfield headquarters at Wright Field, near Dayton, Ohio, has been, for fully a year, utilizing our technical employees and our plastics plant equipment in developing from paper parts of airplanes which have heretofore been to a large extent a combination of plywood and metal.

"Our paper used in our plastics plant is made from Mitscherlich sulphite pulp which is produced from Canadian spruce wood in our pulp mill at Appleton. (Interlake division of Consolidated). The Forest Products Laboratory at Madison, in experimenting with various types of pulp, found a year or more ago that this Mitscherlich sulphite pulp had higher strength qualities than any other type of pulp. There are only three or four other Mitscherlich sulphite pulp mills in the United States."

Kimpreg Highly Commended

Another plastic which is playing a big part in America's war effort is Kimpreg, plastic surfacing molder to both sides of hardwood panels, produced by Kimberly-Clark Corporation, Neenah, Wis. This company is working in teamwork with three others to produce a portable building in which army surgeons at advance bases can perform operations, and where wounded soldiers can be housed temporarily.

The combination of materials withstands tropical deluges, slime, fungi and other scourges of the hot and humid climate of the tropics. Kimsul, the Kimberly-Clark Corporation product for insulation, is used to insulate the hutments.

Medical officers of various services have been enthusiastic in their commendation of the hutments, which are 16 by 16 feet and constructed of plywood panels completely surfaced with Kimpreg. The panels are assembled into four by eight feet wall sections, and glued with phenolic resin in a hot press. They can contain 12 cots, arranged three to each outside wall. Light is admitted through light green plastic windows. Outside air is admitted through plastic screens and additional ventilation through louvres, also screened.

Lake and River Navigation Opens

Great Lakes and Fox river navigation was opened last week, with the arrival at Green Bay, Wis., of six cargo boats, five of them carrying coal, and an ice-breaking tug. The lakes and river are important in transportation of pulp wood and coal to paper mills and other industries.

Total Storage of Water is Low

Water in the reservoirs of the Wisconsin Valley Improvement Company, Wausau, Wis., showed an increase of 1,145,000,000 cubic feet in the entire system. Rainfall during the week ending April 8 was light, but release of ground water and the melting of snow and ice in the upper lakes region accounted for most of the gain.

Total storage was 3,573,000,000 cubic feet as compared to 10,772,000,000 cubic feet a year ago and 12,737,000,000 cubic feet two years ago.

The Big Eau Pleine reservoir gained 625,000,000 cubic feet during the week, and as a result had available 1,348,000,000 cubic feet. In the upper system of reservoirs the gain was 520,000,000 cubic feet, the available supply being 17.54 per cent of capacity.

At the Marathon Paper Mills Company, Rothschild, Wis., 15 feet of the total of 230 feet of gate in the Wisconsin river dam was open and the company's power plant was operating at nearly maximum capacity.

Mill Workers Favor A.F.L. Union

Hourly paid workers in maintenance and production at Kimberly-Clark Corporation's Lakeview and Badger Globe mills, Neenah, Wis., last week voted in favor of the American Federation of Labor Brotherhoods as sole bargaining agents, when 934 votes were cast in favor of the AFL, against 507 votes for an independent union. One hundred and twenty votes did not favor either agency. The total votes represent 86 per cent of the personnel of a reported 1,800 in the two mills. The election was conducted by the National Labor Relations Board.

Will Establish "Tree Farms"

To dramatize to Wisconsin farmers the profit opportunities in forestry as a part of their normal

productive operations, the Wisconsin Conservation Commission will establish small demonstration "Tree Farms" in various parts of the state. The program was inspired by F. B. Trenk, extension forester of the Wisconsin College of Agriculture, who said:

"Timber is a crop and in most sections of the state can be made a profitable enterprise for the landowner.

The objective would be to teach farmers to utilize for their own financial advantage such of their acres as are not suited for regular agricultural production.

Strike Occurs at Nekoosa-Edwards Mill

A work stoppage of 132 workers in the finishing room of the Port Edwards, Wis., mill of the Nekoosa-Edwards Paper Company, which started Wednesday afternoon, had not been ended by last Friday evening. On Friday the paper machines and auxiliary equipment in the four-machine mill closed down as a result of the walkout. Approximately 300 workers, about half the personnel of the mill, were affected by the closing.

Urges Survey to Provide Employment

A consumer survey to determine the possibilities for providing employment in the post-war era is a vital link in any post-war planning program, in the opinion of D. C. Everest, president and general manager of the Marathon Paper Mills Company, Rothschild, Wis., who is general chairman of the planning committee.

"The survey plan that calls for the interviewing of persons in all parts of the city to get a cross-section of what reasonably may be expected is a capital idea and should have the whole-hearted cooperation of all public-spirited citizens," Mr. Everest declared.

Michigan Superintendents Meet

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., April 18, 1944—The Michigan Division of the American Pulp and Paper Mill Superintendents Association held its April meeting at the Park American Hotel Thursday Evening of last week with 85 present. Following dinner Chairman Glen Sutton on behalf of the officers expressed their satisfaction on the large attendance and congratulated the coating committee, composed of Olive W. Calligham, Leon Nimms, Leo Willong Pley, Henry Nendorf and E. W. Hayes on the success of their efforts in promoting the publicity of this meeting, the last one to be held until October.

Past National President Roy H. Kelly of the Marathon Paper Mills company Rothschold, Wis., was a guest of the division and was introduced by Chairman Sutton—as was also Ed Coughlin, a past national president. Announcement was made that the Committee on Program and Arrangements for the annual ladies night party to be held Saturday evening May 6, were all set for the events and its success was assured.

The Speaker was Frank Eagan of the John Waldron Corporation of New Brunswick N. J. whose topic was "Post-War Plans of Conventional and Paper Mill Machine Coating."

He described in detail by means of blackboard diagrams and slides the ten basic methods of coating, the major portion of his address being devoted to that of coating as applied in the paper industry.

Paper Production for February

The following data cover all known mills and represent a continuation of the monthly statistics initiated in "Facts for Industry," series 24-2-1. For annual data and a description of the statistics, "Facts for Industry," series 24-1-2 should be consulted. All inquiries concerning these data should be addressed to the Bureau of the Census, Washington 25, D. C.

TYPE OF PAPER	FEBRUARY 1944	JANUARY 1944	FEBRUARY 1943
All types	1,380,220	1,413,365	[1]1,320,191
Newsprint	54,118	60,101	65,098
Groundwood papers	47,957	50,442	46,804
Printing	17,413	18,412	[2]13,630
Specialties	30,544	32,030	[2]33,174
Book papers	122,171	123,005	128,587
General printing	84,625	88,317	[2]92,877
Converting papers	37,225	34,619	35,051
Other book papers	321	69	[2]659
Fine papers	77,689	78,313	81,804
Writing papers	57,471	57,007	[2]61,426
Cover and text	4,255	4,780	3,407
Reproduction	4,186	4,017	[2]3,683
Bristols[3]	6,626	7,841	[2]7,707
Thin papers	4,772	4,473	4,299
Other fine papers	379	195	482
Wrapping papers	163,473	172,174	162,049
Bag papers	34,849	39,902	45,113
Glassine	7,051	6,688	6,681
Greaseproof	2,244	2,623	2,111
Vegetable parchment	2,638	2,730	2,749
Converting papers	66,206	67,273	[2]45,957
Wrapping papers	50,485	52,958	[2]59,438
Multi-wall sack papers	29,558	28,812	18,117
Special industrial papers	[4]19,250	[4]18,610	14,869
Sanitary papers	64,937	67,857	64,801
Tissue papers	12,908	13,739	12,880
Absorbent papers	7,262	7,821	6,474
Building papers	74,416	72,132	71,068
Paperboard	706,481	720,359	648,432
Container board	333,872	344,834	308,828
Folding boxboard	164,010	160,847	148,343
Set-up boxboard	53,299	56,755	67,577
Cardboard	5,579	5,008	4,830
Building board	88,397	92,324	84,382
Miscellaneous other board	61,324	60,591	34,472
Tube stock	43,048	41,631	18,971

[1]Includes a small quantity of paper not classified by type.
[2]Data revised to conform with certain changes in paper and paperboard classifications, which became effective beginning January 1944.
[3]Includes Government Postal Card stock.
[4]Includes a small quantity of Special Industrial papers, having a basis weight of less than 100 pounds. Such paper was classified Wrapping paper prior to January 1944.

Allows More Mill Repairs

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 19, 1944—The dollar value of repairs and maintenance parts for paper-mill machinery permitted under Limitation Order L-83 has been increased from $1,000 to $2,000, the War Production Board announced today. More than $2,000 may be spent for repairs and maintenance only in the event of an actual breakdown or suspension of operations, according to the amendment to Order L-83.

Another provision of the amendment requires the use of Form WPB-1319 for all applications for equipment and machinery. Such applications for equipment costing less than $2,500 may be filed with WPB Field Offices, but applications for equipment valued at more than $2,500 must be mailed direct to the Paper Division, WPB, in Washington.

Ansul Chemical Co. Opens Office

A new office, providing much needed additional room, will be opened about May 1 in New York City by Ansul Chemical Company, Marinette, Wis. The company has leased space in the Lincoln Building at 60 East 42nd street. Dugas Engineering Corporation an Ansul subsidiary, will occupy the same quarters. T. R. (Bob) Kearney will handle the Ansul line and Glen Stratton will be in charge of Dugas activities.

Much Paper Now Delivered on End-Use Basis

Tightening of Paper Supply Expected To Continue For Trade Consumption With More Rigid Allocation of Pulp Program—Salesmen Plan Feature Meeting — Chicago Reports Good Salvage Record.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., April 17, 1944—The effect of the pulp allocation program continues to be the major topic of discussion in the Chicago paper trade area. Deep concern is being evidenced over the possibility of maintaining deliveries to the civilian trade and the jobber industry, locally, is on a very careful end-use basis even at this time. Reports are current that very shortly the business concern requiring any paper must prove that the usage will aid the War effort or is indispensable to carrying on home front business.

The groundwood and newsprint markets locally showed little change over last week, with the feature news reported in the book paper industry where the demands of the trade were piling up huge backlog of orders as the quest for paper continues. Sulphites in all grades also remained very, very strong while krafts were "away out of sight" as far as orders were concerned. Waste paper collections continued good though not yet adequate to meet mill needs according to local reports.

Salesmen Plan Feature Program

The western division of the Salesmens Association of the Paper Industry is to have the second of its series of open houses for the year on May 1 at the Hotel Sherman in Chicago. The Monday noon session will feature the appearance of Douglas C. McMurtrie of the Ludlow Typograph Company who is internationally known as a student of and speaker on typography and its modern usage. Mr. McMurtrie's appearance will not be the only feature, though the SAPEYES consider his name on the program as sufficient to draw a record crowd of members and guests. The added attraction will be a moving picture, the film supplied by the Cherry River Paper Company and the title "Paper—The Guardian of Health." This film is reported as timely, exceedingly well photographed and of educational value to the entire paper industry.

The news is also current that the western division will feature three golf outings this summer though the exact details will not be announced until the weather is warm enough to excite the competitive lust in the hearts of the golfing members. It is expected that the three will be held in the months of June, July and August with exact dates and club sites announced later.

Chicago Has Good Paper Salvage Record

More than one tenth of all the waste paper collected by volunters in the entire nation since January 1 was gathered by the elementary school pupils of Chicago according to a recent editorial in the Chicago Herald-American. All the paper donors of the nation, reported the newspaper, sent 117,000 tons of waste paper to the mills in January, February and March. Twelve thousand and fifty five tons of it was sent by Chicago. Over 77,000 tons of it was contributed by the region immediately surrounding Chicago-Cook and the surrounding eleven counties. Thus, this one small midwestern area provided about two-thirds of the nation's contributions of scrap paper. However, to keep the paper mills producing war essential articles at full capacity would, reports the article, require 22,000 tons a month more than has thus far been provided. Midwestern mills, much better off than those of other sections, nevertheless have only enough waste on hand to keep running for 10 or 11 days.

R. W. Banks Transferred to Mills

Richard W. Banks, for a number of years identified with the Chicago and surrounding sales program of the Albemarle Paper Manufacturing Company, has been transferred "for the duration" to the Albemarle mills at Richmond, Virginia. As a sort of "sign of the times" Mr. Banks will be transferred from sales work to the position as manager of the personnel department of the mill.

Lake Newsprint Shipments Arrive

One sign of Spring which occurred in the Chicago area this week was the arrival at Chicago docks of the first ship of the season to bring a cargo of newsprint from the Chicago Tribune mills at Thorold, Ontario to the Tribune warehouse. The ship arrived after a tussle with ice and storm that lost a day's time but it still docked two weeks ahead of last years first arrival and a week ahead of the usual time. The Tribune, during the same week, announced that it had petitioned the War Production Board for sufficient stock to begin a new newspaper at Milwaukee, Wis.

Must Report Basic Weight Changes

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 19, 1944—Manufacturers who reduce the chemical pulp content or basis weight of paper towels or toilet tissue with no change in ceiling prices as allowed February 14, 1944, must make a simple report on the reductions made, the Office of Price Administration said today.

This report, which should be sent to OPA at Washington, D. C., must state (1) the chemical pulp content and basis weight of the products affected on November 26, 1942, the effective date of the original regulation on paper towels and toilet tissue, and (2) all subsequent changes in the chemical pulp content and basis weight and the dates of the changes.

Effective February 14, 1944, manufacturers were permitted to reduce the basis weights of paper towels by 10 per cent and of toilet tissue by 5 per cent, and to reduce the chemical pulp content of both paper towels and toilet tissue by 15 per cent, without making any change in their maximum prices. This was done to help in the fiber conservation program of the War Production Board.

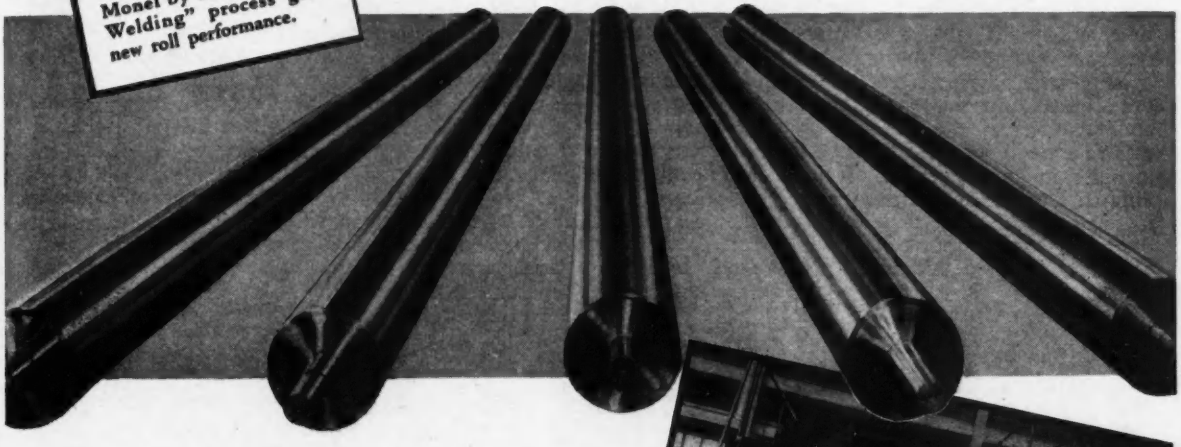
(Amendment No. 8 to Maximum Price Regulation No. 266—Certain Tissue Paper Products—effective April 20, 1944.)

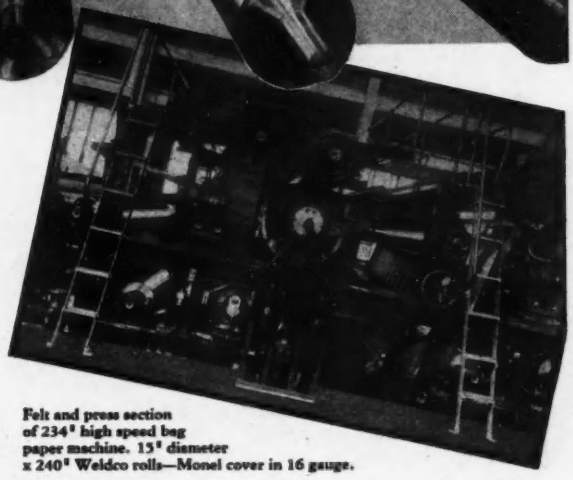
Old rolls recovered with Monel by the "Pressure Welding" process give new roll performance.

THIS ROLL RECLAIMING METHOD GIVES

Extra Service

*WELDCO Applies Monel Covers by "Pressure Welding"





Felt and press section of 234" high speed bag paper machine. 15' diameter x 240" Weldco rolls—Monel cover in 16 gauge.

Users of WELDCO Covered Rolls Say:

"BETTER THAN EVER"

Here's the reason why Weldco Monel-covered paper machine rolls receive enthusiastic endorsement by men who use them.

A Monel cover of the proper gauge (to meet specific requirements) is applied over old or new cores by the patented Weldco "Pressure Welding" process. Through the use of this process, roll covers are applied in a manner which assures a permanent tight fit and they will serve for years without regrinding and other maintenance. Even under heavy wartime production, they continue to have smooth, clean surfaces, free from pitting, corrosion, and wear. In short, Weldco rolls are acid resistant, precision made, straight, and they withstand the abrasive action of doctor blades and other materials with which they come in contact. Furthermore, no galvanic action occurs between the bronze wire and the Monel rolls. We believe you, too, would enjoy such qualities.

PROOF OF PERFORMANCE

There are more than 1000 Weldco roll installations operating in all types of mills. A few comments on their service are as follows:

From a Virginia Kraft Mill, after using Weldco Monel wire rolls for 3 years: "It is the contention of our maintenance crew as well as our operators that these rolls are giving excellent service."

A South Carolina Kraft Mill writes after 3 years of service with Weldco rolls: "Our Paper Mill Superintendent is very emphatic in his expression that as to wear resistance, cleanliness, and smooth surface of his 13 Monel-covered rolls on our board machine, that in these qualities the rolls (Weldco) are superior to any we have ever used."

Another states: "Monel-covered rolls on Downington Press are giving satisfactory service as to wear resistance, cleanliness, and smoothness."

On the basis of this evidence, why don't you investigate now the possibilities of using Weldco, "Pressure Welded," Monel-covered rolls for maintenance as well as new equipment? Send for booklet 49C which gives you further performance proof, *or consult your machinery builder.*

★ **WELDCO**

THE YOUNGSTOWN WELDING & ENGINEERING CO.

3751 OAKWOOD AVE. YOUNGSTOWN 9, OHIO

Butterworth Post-War Plan

Many manufacturers of textile machinery have been offered large contracts for machinery to be delivered at the cessation of hostilities or when WPB releases critical materials.

In an effort to establish a policy that will be entirely equitable to both the buyer and the seller, the H. W. Butterworth & Sons Company has formulated the following plan:

The H. W. Butterworth & Sons Company has agreed to accept orders, knowing that the price quoted might be entirely out of line at the time of manufacture. Its plan is to quote the price of the machine, certifying the value of the material and the total amount of labor and burden at the time the quotation is made.

In the event that either of these items are less than the originally quoted price at the time of completion and shipping of the machines, the purchaser will receive a credit for the difference. In case there is an increase in cost in either of these two items, the difference will be an additional billing by Butterworth to the purchasor. In this way, both the seller and the purchasor are protected.

Orders accepted by H. W. Butterworth & Sons Company for post-war delivery are not subject to cancellations.

Interprets Container Board Order

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 19, 1944—Any person who requires container board for any purpose whatever is prohibited from accepting it without the specific authority of the War Production Board, the agency said today. This was emphasized by an Interpretation to Conservation Order M-290, just issued by the WPB Paper Board Division. An amendment to this order exempts from its purview any container board product which is defined as a "fiber shipping container" in Order P. 146.

Control of all container board after April 1, 1944, was assumed by WPB on March 6, at which time it was pointed out that container board meant all types and grades of that product, as well as corrugated or solid fiber sheets, such as are used in sheet plants and by cleated-box manufacturers in making containers or any other product. The order provides that no person may accept delivery of container board, except as authorized by WPB in writing, and the interpretation points out that this prohibition applies not only to container manufacturers, sheet plants and cleated-box manufacturers, but also to any other persons using container board.

M E Clark Returns To Wyandotte

M. E. Clark, former manager of Market Research of Michigan Alkali Company, has returned to Wyandotte Chemicals Corporation as assistant director of Technical Service and Manager of Market Research. Mr. Clark was granted a leave of absence in July of '41 at the request of the Office of Price Administration to accept special duties in Washington, D. C., where he later became chief of the Program Section of the War Production Board. He is a graduate of the University of Colorado in chemical engineering, and for several years was a member of the editorial staff of Chemical and Metallurgical Engineering.

L. C. Currier Made Mill Manager

At the annual directors meeting of the Sorg Paper Company, Middletown, Ohio, L. C. Currier was made mill manager and elected to the executive committee and board of directors. Prior to this appointment, Mr. Currier served as manager of the Oglesby & Smith Divisions and assistant manager of the Sorg Division and as such, he was responsible for the production of these divisions. At the same meeting C. A. Sorg was made production manager for all three mills.

Mr. Currier's new responsibilities include supervision over the production manager, power and electrical engineer, maintenance engineer, mill engineer, technical director and receiving foreman.

Promptly upon receiving a Bachelor's Degree from the Massachusetts Institute of Technology in 1926, Mr. Currier entered the employ of the Berwin Paper Corporation, Dansville, N. Y., in the operating and production departments. He was assistant superintendent of this company when he left its employ in 1930 to accept a position in the production department of the Sorg Paper Company where he worked under A. F. Smith, vice president in charge of manufacturing, as an assistant in our Oglesby and Smith Divisions until April, 1938, when he was made manager of our Oglesby and Smith Divisions and assistant manager of the Sorg Division.

Taggart Starts Engineering Dept.

[FROM OUR REGULAR CORRESPONDENT]

OSWEGO, N. Y., April 17, 1944—Announcement is made of the establishment of an engineering department at the local branch of the Taggart Corporation which will carry on enginering work directly associated with the bag making industry. This division will be under the supervision of the general manager and the engineering work will apply to some degree at least to all factories coming under the common management or direction of the concern. Previously, the engineering work was performed in the machine division of the St. Regis Corporation. It was stated that at present the local plant is engaged in the manufacture of a special kind of multiwall bag for the government, under contracts with the Chemical War Service of the army.

Ex-Paperman—Paratrooper

Sgt. Burke has been in action in the South Pacific and has recently returned from Bougainville for a 28 day leave of absence. He has returned to California and is now stationed at the naval base in San Diego. Prior to his enlistment in the U. S. Marine Corps on January 5, 1942, he was employed by Walker-Goulard-Plehn Company, Export Department.

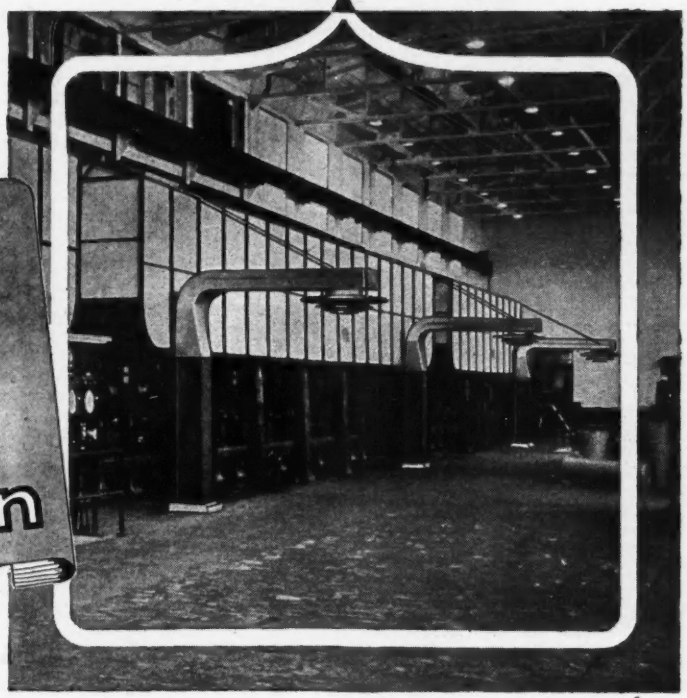
Brill Equipment Co. Moves

The Brill Equipment Company, machinery dealers, is moving its offices and warehouse from 183 Varick Street where it has been for the past twelve years. The new offices will be located at 225 West 34th street, New York City and the new warehouse and shop will be located at 2401—3rd Avenue, Bronx, New York. Consistent growth enabled this move to larger quarters.

Most comfortable spot in the mill this summer will be HERE

IF YOU INSTALL

ROSS Summer Ventilation



An entirely separate system, quickly and easily installed, that provides ideal spot cooling for workers' comfort and efficiency. Usually installed in the working aisle in front of the dryers. this remarkable new ROSS Summer Ventilation System achieves results that cannot be secured by supplying air at the roof. Every installation has resulted in greatly reduced loss of time due to sickness and fatigue. Banish hot spots this summer!

Now is the time to plan for Summer Ventilation. Our engineering staff will gladly give you detailed information. Tell us about your conditions and requirements. You can rely upon recommendations by ROSS.

ROSS SYSTEMS

J.O.ROSS ENGINEERING CORP.

350 MADISON AVE., New York 17, N. Y.

CHICAGO 6—201 North Wells St. **DETROIT 3—12953 Greeley Ave.**

ROSS ENGINEERING OF CANADA, LTD., Dominion Square Building, Montrose

CONTROL OF AIR FOR MODERN INDUSTRY

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending April 15, 1944

STOCKS

	High	Low	Last
A. P. W.	2⅝	2⅝	2⅝
Armstrong Cork Co.	37⅜	35¾	36
Celotex Corp.	12¼	11½	11½
Celotex Corp., pf.	18	17¾	17¾
Certain-Teed Products Corp.	5⅜	5	5
Certain-Teed Products Corp., pf.	61	59	59½
Champion Paper & Fibre Co.	24¼	23¾	24¼
Champion Paper & Fibre Co., pf.	109½	108¾	108¾
Congoleum Nairn Co.	23⅜	23	23
Container Corp. of America	23¼	22¾	23
Continental-Diamond Fibre Co.	11⅜	11½	11½
Crown-Zellerbach Co.	16¾	16⅝	16⅝
Crown-Zellerbach Co., pf.	100	98½	100
Dixie Cup Co.	....	....	....
Dixie Cup Co.—A	44¾	44½	44⅜
Flintkote Co.	22⅜	21¾	22¼
Flintkote Co., pf.	105½	104⅞	105
Robert Gair	3⅜	3¾	3⅜
Robert Gair, pf.	14⅞	14⅞	14⅜
International Paper Co.	15⅛	14⅜	14⅝
International Paper Co., pf.	74½	73¼	74½
Johns-Manville Corp.	91	88½	88½
Johns-Manville Corp., pf.	....	....	....
Kimberly-Clark Corp.	35½	35⅛	35½
MacAndrews & Forbes	26½	26	26
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	47¾	38¾	46¾
Mead Corp.	9	8½	8¾
Mead Corp., pf. A—6%	89½	89½	89½
Mead Corp., pf. B-5½%	80½	80½	80½
National Container Corp.	14¾	13⅞	13⅞
Paraffine Companies, Inc.	49¾	49	49
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	14½	14½	14¼
Rayonier, Inc., pf.	30¾	29⅞	30¼
Ruberoid Co.	29	28½	29
Scott Paper Co.	40	39½	39½
Scott Paper Co., pf.	109	109	109
Sutherland Paper Co.	30½	30½	30½
Union Bag & Paper Corp.	10	9¾	9⅞
United Paperboard Co.	4¾	4¾	4¾
U. S. Gypsum Co.	74½	72¼	72½
U. S. Gypsum Co., pf.	178	176	176½
West Virginia Pulp & Paper Co.	18½	18⅛	18⅜
West Virginia Pulp & Paper Co., pf.	107	106	107

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 3¾s '55	103¾	103½	103½
Certain-Teed Products Corp. 5½s '48	101¾	100½	101¼
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	107⅛	107	107⅛
International Paper Co. 5s '47	104¾	104	104
Mead Corp. 3½s '53	....	....	....
West Virginia Pulp & Paper Co. 3s '54	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending April 15, 1944

STOCKS

	High	Low	Last
Great Northern Paper Co.	33	33	33
Hummel-Ross Fibre Corp.	5¼	4⅞	5⅛
St. Regis Paper Co.	4¾	4¾	4⅝
St. Regis Paper Co., pf.	149	148½	148½
Taggart Corp.	5½	5½	5½

BONDS

American Writing Paper Co. 6s '61	101½	101½	101½

St. Regis Elects Directors

At the annual meeting of the stockholders of St. Regis Paper Company held on April 14 at the office of the Company, 595 West Main street, Watertown, N. Y., the following directors were elected for the ensuing year:

J. O. Bulkley; T. H. Cosford; W. DeLong; W. K. Dick; W. J. Dixon; R. K. Ferguson; M. F. Ford; H. S. Lewis; H. E. Machold; C. R. Mahaney; R. B. Maltby, C. B. Martin; J. A. Quinlan; W. H. Versfelt.

R. K. Ferguson, President of the Company, presided at the meeting and advised stockholders that the business of the Company and subsidiaries for the first quarter of 1944 is running approximately 30% ahead of the same quarter last year. The improved showing does not reflect any benefit from the reopening of the Company's kraft pulp mill at Tacoma, Washington, which resumed operation on March 27, 1944.

Mr. Ferguson reported to the stockholders the Company's sale to four insurance companies at par and accrued interest, $10,000,000 principal amount of St. Regis Paper Company 15-Year 3¾ Debentures, dated January 1, 1944, due January 1, 1959. From the proceeds of this financing, the Company has retired its bank loans and funded debt other than the $900,000 non interest bearing notes payable to the West Fork Timber Company.

Furthermore, the Company's wholly owned subsidiary, Valve Bag Company, redeemed on April 1, 1944 its outstanding 6% Cumulative Preferred Stock at 105 and dividends.

Mr. Ferguson also announced that the Army and Navy had conferred upon the Panelyte Division of the Company the Army-Navy Production Award and that the presentation had been set for May 9, 1944 at the plant in Trenton, N. J.

Hampden Glazed Paper Co. Meets

The annual meeting of the stockholders of the Hampden Glazed Paper and Card Company was held at the office of the company March 29th, 1944.

Several changes were made in the officer personnel. Ralph N. Fowler continues as president, and George B. Fowler, now serving in the U. S. Navy, was re-elected a vice-president.

Rufus F. Blount was elected treasurer, and James A. Leyden, formerly manager of sales in the New York area, was elected a vice-president. Mr. Leyden will spend several days a week at the mill in Holyoke. Esther S. Mason continues as clerk.

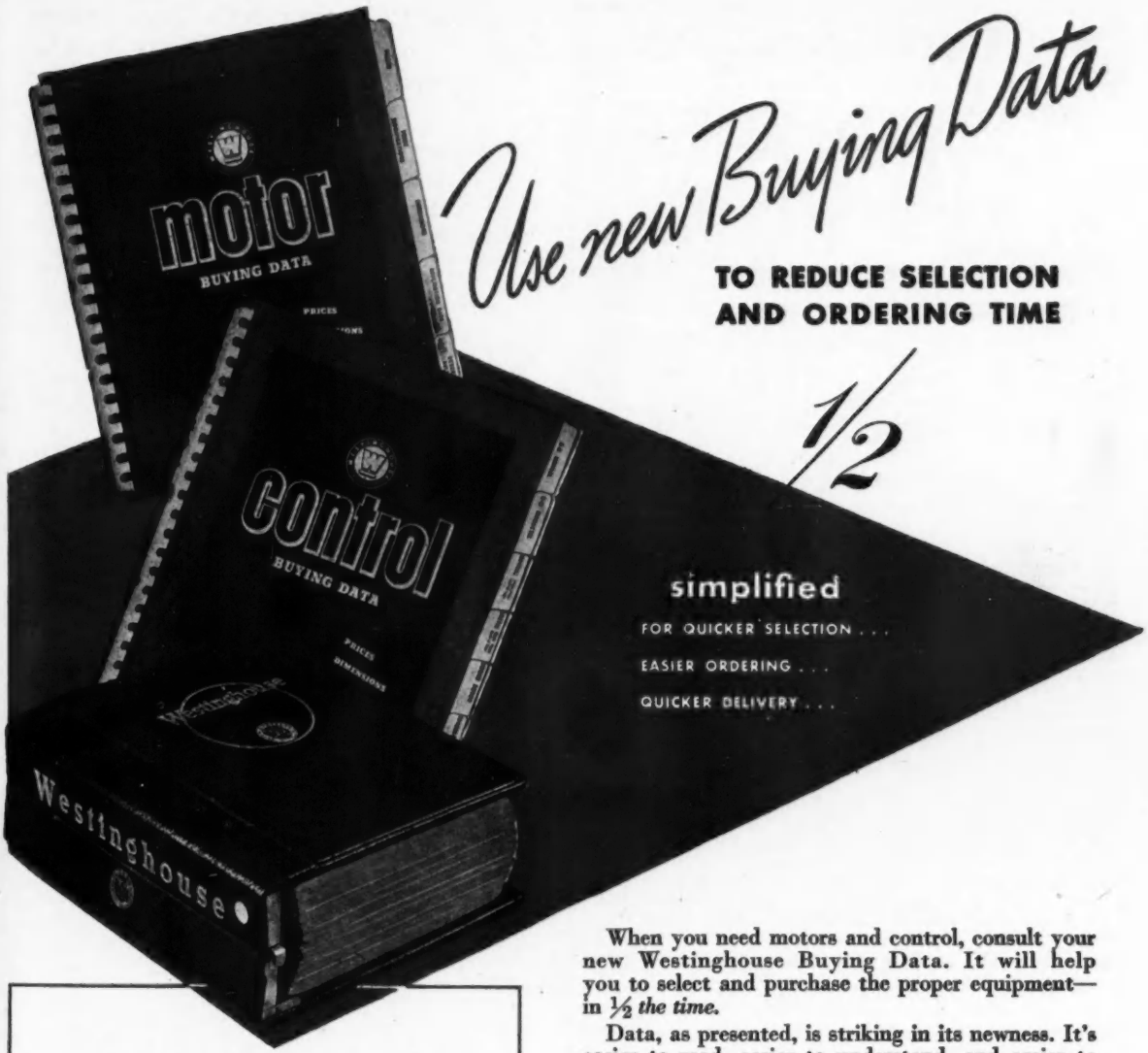
The company reported results of operations for the year 1943 as generally satisfactory, and reported demand for its products continues strong.

The following were elected to the board of directors: Ralph N. Fowler, George B. Fowler, John L. Bagg, Rufus F. Blount and James A. Leyden.

T. E. Hollingsworth Goes With WPB

MONROE, Mich., April 17, 1944—As of March 20, T. E. Hollingsworth, Jr., manager of the River Raisin Paper Company's office at Syracuse, N. Y., has been granted a leave of absence to accept a position with the War Production Board, Containers Division, at Washington, D. C., as a $1.00 per year man.

Mr. Hollingsworth's experience in the fiber and corrugated field covered a period of twenty-six years, the first few years having been spent in the manufacturing operations and since then in the sales and designing divisions.



Use new Buying Data

TO REDUCE SELECTION AND ORDERING TIME

1/2

simplified

FOR QUICKER SELECTION . . .

EASIER ORDERING . . .

QUICKER DELIVERY . . .

When you need motors and control, consult your new Westinghouse Buying Data. It will help you to select and purchase the proper equipment—in *½ the time.*

Data, as presented, is striking in its newness. It's easier to read, easier to understand, and easier to use than any offered previously by any manufacturer.

To fit widely varying requirements, this radically new Buying Data is available in two forms:

Motor and Control Loose-Leaf Book. This is for the use of large-scale purchasers and is "tailored" to meet the needs of the individual buyer. Pricing data is always kept up to date by the issuance of new price supplements.

Bound books are suitable for use of the majority of motor and control buyers. They contain prices (correct at time of issue and satisfactory for estimating purposes throughout the books' life), dimensions, application data and descriptions. Books include:

"Motor Buying Data" covering popular types and ratings of motors (up to 100 hp), Gearmotors and M-G sets.

"Control Buying Data" listing a wide variety of controllers and accessories for direct current, single-phase, squirrel-cage, wound rotor motors.

J-90499

HERE'S HOW TO GET THIS NEW BUYING DATA

If you are a buyer of Motors and Control, chances are you have already received this new data by mail.

However, if you have not received your copy, write, wire or phone your nearest Westinghouse district office (requests will be filled through district offices only—no mailings from Westinghouse Headquarters at East Pittsburgh). Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Westinghouse

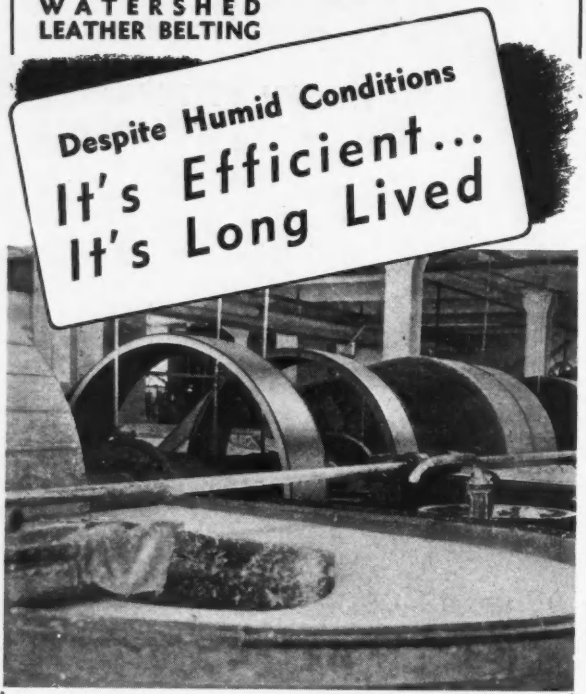
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MOTORS AND CONTROL

For Real Economy equip machines with

TANNATE

WATERSHED LEATHER BELTING



In paper and pulp mills, where hot, humid conditions are encountered Tannate Leather Belting maintains a high operating efficiency throughout a long service life.

In fact, Tannate carries nearly full load even when damp. Tannate is made with waterproof cement and is treated for moisture resistance. It is also resistant to machine oils and many weak chemicals. Little maintenance is required except an occasional application of Rhoads Tannate Belt Preserver.

Next time — specify Tannate.

for EFFICIENCY + ECONOMY
Equip with RHOADS
Tannate
WATERSHED
LEATHER BELTING

—Established 1702—

J. E. RHOADS & SONS

35 N. SIXTH ST., PHILADELPHIA, 6, PA.

NEW YORK • CHICAGO • ATLANTA • CLEVELAND

TAPPI Empire State Groups Meet

Two groups of the TAPPI Empire State Section met during the past week.

The Black River Valley Group met at the Woodruff Hotel, Watertown, N. Y. on Thursday evening, April 13. Thirty-eight attended. Charles Vickery of E. D. Jones & Sons, Pittsfield, Mass., talked on Stock Preparation. "This covered the historical development of beaters and jordans, their action on pulp fibers, and improvements that have been made, based on theories that have been evolved.

Those present included: William Adams, W. J. Argy, W. Arsenault, M. H. Bennett, W. R. Benson, C. S. Booth, F. J. Brown, L. C. Burdick, Cur. Crusios, George Duers, Howard W. Duggan, Sven Fahegren, W. O. Forbes, E. A. Godfrey, F. C. Goodwill, P. J. Hackett, T. Hutteman, Ern Jones, T. E. Loessi, Russell T. Mann, E. F. Marshall, Joseph Martin, Ed. Morcalieri, J. A. McDermott, L. C. Nevin, M. T. Newcomb, J. P. Omsby, George Pennock, Henry Perry, Tex Richards, Carl F. Richter, J. A. Spencer, Beau. Thomas, B. H. Treadwell, J. H. Treadwell, Charles Vickery, F. M. Williams, M. E. Wright.

The Hudson River Group met at the Queensbury Hotel in Glens Falls, N. Y., on Friday evening, April 14. Foster P. Doane of the Sandy Hill Brass Works presided. About 50 attended. Vance Edwardes, president of the association drew attention to the many services of the association, many of which may not be fully known to members although they are indicated in great detail in the TAPPI Year Book. R. G. Macdonald, secretary-treasurer of the association discussed the progress made in paper technology during the war and indicated how these may be expected to fit into the postwar picture. W. J. O'Brien, secretary of the Empire State Section reported on the activities of the three groups.

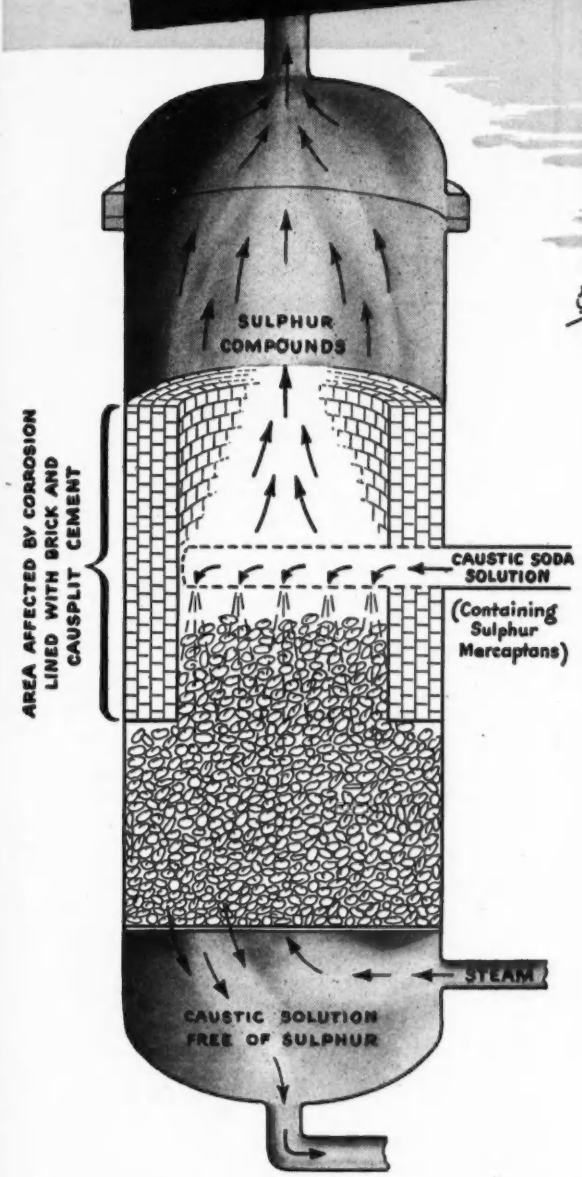
The principal speaker was Fred O. Sundstrom of Heller & Merz Div. of the Calco Chemical Company. His subject was the Effect of Rosin Size on Dye Retention. In this talk Mr. Sundstrom pointed out that American dyes, for the most part are as good as any that have been made in the world. Technological advances in the textile industry have been greater than those in the paper industry because of the larger number of variables met in the latter.

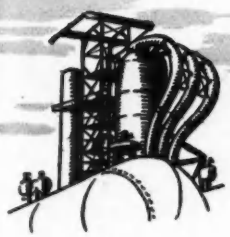
Following are some of the variables to be met in considering dye application to paper fibers: water (hardness, temperature, pH.), pulp (how cooked and washed and degree of hydration), size (amount and kind), alum, nature of fillers, basis weight of sheet made, chemical additives, drying temperatures, dye consistency, time of contact with fibers, dispersal of dye, color fastness required, storage conditions, etc.

Mr. Sundstrom gave a preview of a long range research project in which his staff is studying the dyeing effects. To date the work has been done only on certain acid colors, primarily used for the coloring of protein materials. By keeping the raw material (unbleached sulphite), pH (based on alum concentration) and type of size constant the degree of coloring, (measured with a spectrophotometer) of the paper (handsheets) and of the back water is measured. The principle variables being considered are the amounts of size present and the concentration of the dye. Progress reports of this week will be reported from time to time, particularly when the more common paper fiber dyes are investigated.

When repairs call for ACTION --depend on PENNSALT CAUSPLIT CEMENT

REG. U. S. PAT. OFF.


SULPHUR COMPOUNDS
AREA AFFECTED BY CORROSION LINED WITH BRICK AND CAUSPLIT CEMENT
CAUSTIC SODA SOLUTION
(Containing Sulphur Mercaptans)
STEAM
CAUSTIC SOLUTION FREE OF SULPHUR



At a leading oil refinery emergency repairs were required on the lining of a Mercaptan Tower . . . because of sulphur erosion at the intake area.

The engineers in charge thought they were faced with a three-day shut-down for repairs, with the resultant loss of production.

A Penn Salt technician was called in and after going over the situation he recommended Causplit Cement in conjunction with corrosion-resistant brick. He gave installation instructions and four courses of the brick were used with Causplit Cement as the bonding material throughout. Drying was speeded by heating the tower to 100 degrees F. *and the equipment was back in service the next day!*

Pennsalt Causplit* and Asplit* are resin cements —exceptionally strong, abrasion-resistant and easy to handle. Causplit is used where conditions are alternately acid and alkali . . . Asplit where conditions are always acid.

Pennsalt Penchlor* Acid-proof Cement is a quick-setting, self-hardening sodium silicate cement that will save time in construction and stand up well under severe acid conditions.

Consult Penn Salt technicians about *your* acid or alkali handling problems. Their wide experience is available without obligation. Write fully or return the coupon.

Causplit and Asplit can be supplied only for essential service . . . Penchlor Acid-proof Cement is available without restriction.

PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals
1000 WIDENER BUILDING, PHILADELPHIA 7, PA.
New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

PENNSYLVANIA SALT MANUFACTURING COMPANY
Dept. PTJ, 1000 Widener Bldg., Philadelphia 7, Pa.
I would like to have a free copy of your new booklet No. 6 on Penchlor Acid-proof Cement.
NAME_____
TITLE_____
COMPANY_____
ADDRESS_____

*Trade-marks Reg. U. S. Pat. Off.

Why **L-R COUPLINGS**
are Especially Efficient
for Severe Demands of
PAPER and PULP MILLS

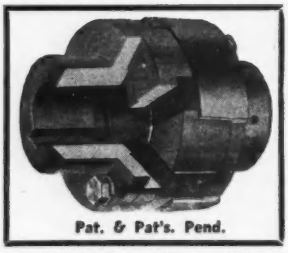
L-R

FLEXIBLE COUPLINGS

- Load capacities accurately rated for pumps, heaters, grinders, etc.
- Positive correction of misalignment—angular, parallel, or combinations.
- Ruggedly equal to any shock, backlash, overloading and reversal stresses.
- Easily installed, inspected and maintained. Cushions always in sight. No shutdowns for changing.
- Insulating. Resistant to oil drippings. Protect from combustion.

L-R TYPE "HQ"

Cutaway and drawing illustrates L-R principle of construction — free-floating resilient load cushions hung between metal jaws, free to deform instantly to any emergency. *No internal friction.* Type "HQ" is for 3.91 to 744 h.p. at 100 r.p.m.



Pat. & Pat's. Pend.

SEND FOR COMPLETE CATALOG

Shows couplings for every duty from 1/6 to 2500 h.p. Free Selector Charts with catalog enable you quickly to select couplings exactly adapted to your need. Full engineering data and prices at hand. Wire or write

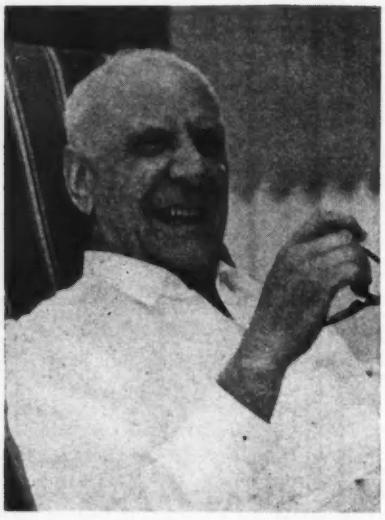
LOVEJOY FLEXIBLE COUPLING CO.
4946 West Lake St., Chicago 44, Ill.

Arthur B. Sherrill Dead

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., April 17, 1944—Arthur B. Sherrill, paper merchant for 40 years, died during the week at Temple University Hospital, at the age of 70. Mr. Sherrill, who lived at the Garden Court Apartments, was a former president of the Philadelphia Paper Trade Association, a member of the Philadelphia Typothetae and of the Philadelphia Paper and Cordage Association.

He was dean of the paper trade, and influental



ARTHUR B. SHERRILL

in both the Philadelphia Paper Trade Association and Philadelphia Paper and Cordage Association.

He is survived by two sons, Arthur M. and Leicester H., both of New York; three brothers, Miles S., Edgar B. and Everett A., and a sister, Caroline, all of Boston.

E. G. Bailey Becomes Chairman

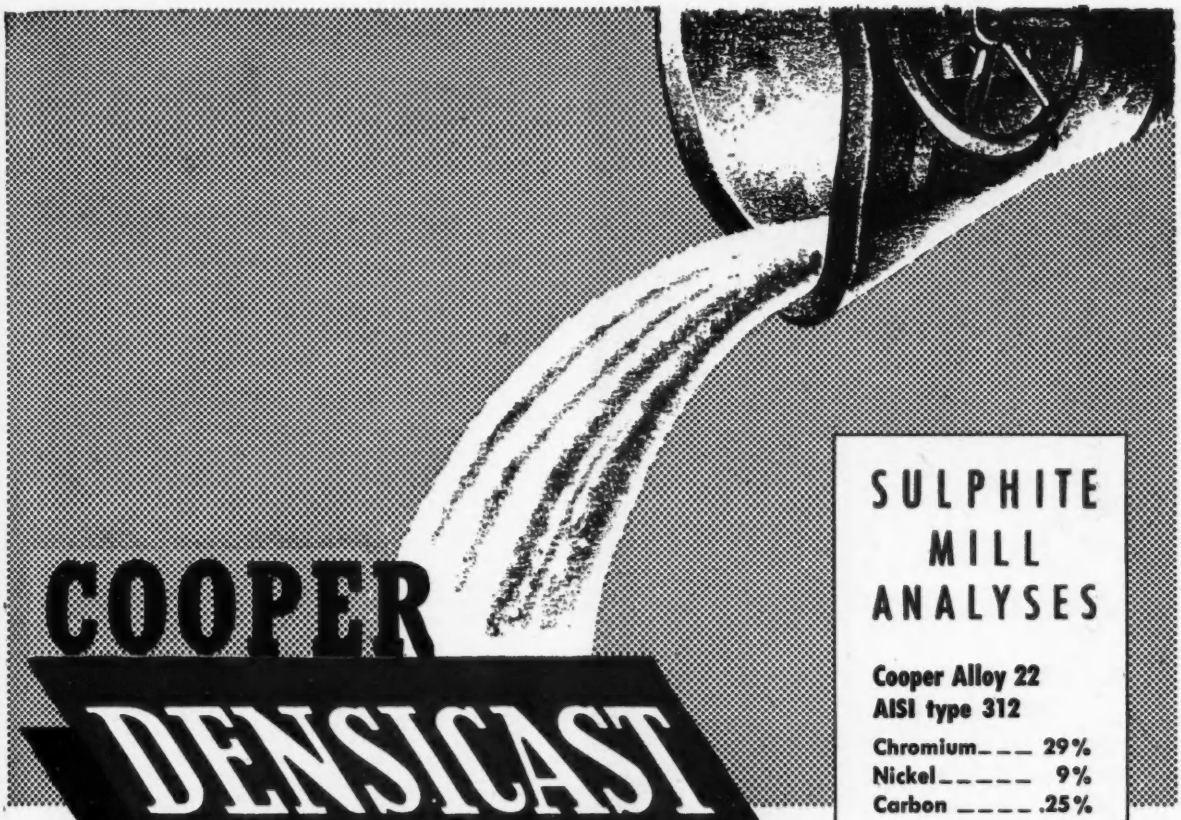
At an organization meeting of Bailey Meter Company directors held on March 30, E. G. Bailey, former president and company founder, was elected chairman. Robert S. Coffin succeeds as president.

Mr. Coffin, who has been vice president since 1925, became identified with Bailey Meter Company as treasurer at the time of its organization in 1916.

Other officers elected at this meeting are, R. E. Woolley, vice president, who has served in that capacity since 1927, and J. H. Black, secretary-treasurer.

Bailey Meter Company was organized in 1916 by E. G. Bailey to serve power plants and process industries with engineered instrumentation. One of the earliest products was a Steam Flow-Air Flow Boiler Meter which makes possible efficient boiler operation. It has been conservatively estimated that the thousands of these meters that are in use today are saving the Nation's power and process plants over three million tons of coal annually, in addition to large quantities of oil and gas.

This company's present line of products includes meters and controls for both stationary and marine power plants, process industries, water supply and sewage treatment plants. One of its new products is a contour control for the automatic operation of machine tools.



COOPER DENSICAST

STAINLESS CASTINGS

Superior grain refinement with a resultant denser structure makes Cooper Densicast stainless castings stand up longer in sulphite pulp mill service. They have greater corrosion-resistance and higher physical properties without departing from standard chemical compositions such as AISI — types 312, 316 and 317.

This is but one of many ways in which this foundry provides specialized casting services for sulphite mills. Services founded upon experience with the specific requirements of sulphite mills. We have made stainless castings for the paper industry since 1928. Some of them are still in service.

SULPHITE MILL ANALYSES

Cooper Alloy 22
AISI type 312

Chromium	29%
Nickel	9%
Carbon	.25%

Cooper Alloy 17 SMO
18-8 SMO
AISI type 316

Chromium	18%
Nickel	8%
Molybdenum	3%
Carbon	.10%

AISI type 317

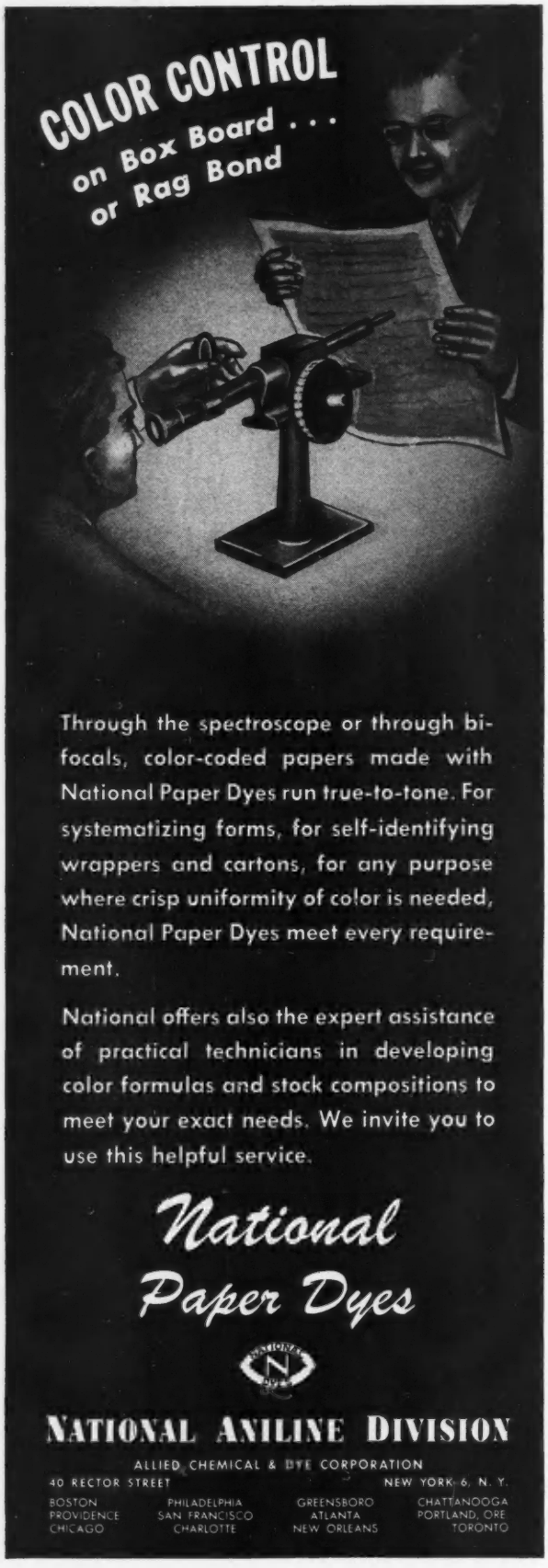
Chromium	19%
Nickel	12%
Molybdenum	3.5%
Carbon	.10%

THE Cooper ALLOY FOUNDRY CO.

The Cooper Alloy Foundry Co.
145 Bloy St., Hillside, N. J.

THE *Only* ALLOY FOUNDRY WITH *All* THESE FACILITIES

- Laboratory control over raw materials and finished products.
- Dual foundry . . . both hand and machine molding.
- Electric arc and high-frequency-induction melting furnaces.
- Centrifugally-cast castings.
- Heat treating of castings up to six feet in size.
- X-ray and Gamma-ray inspection.
- Machine shop . . . specially equipped for finishing stainless steel.
- Improved cleaning . . . including Lustracast electrolytic finishing which leaves all surfaces bright.
- Castings furnished rough, polished or fully machined . . . one ounce to two tons.
- Development of special alloys to meet unusual requirements.
- Technical consulting service.


COLOR CONTROL
on Box Board . . .
or Rag Bond
Through the spectroscope or through bifocals, color-coded papers made with National Paper Dyes run true-to-tone. For systematizing forms, for self-identifying wrappers and cartons, for any purpose where crisp uniformity of color is needed, National Paper Dyes meet every requirement.
National offers also the expert assistance of practical technicians in developing color formulas and stock compositions to meet your exact needs. We invite you to use this helpful service.
National
Paper Dyes
NATIONAL ANILINE DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET
NEW YORK 6, N. Y.
BOSTON
PROVIDENCE
CHICAGO
PHILADELPHIA
SAN FRANCISCO
CHARLOTTE
GREENSBORO
ATLANTA
NEW ORLEANS
CHATTANOOGA
PORTLAND, ORE
TORONTO

PRICE FIXING CHARGED

(Continued from page 11)

practices, agreements and understandings set forth, by means of exhortations, threats, personal contact by the association's secretary, investigation of complaints and other coercive methods.

The complaint alleges that the tendency and results of the respondents' agreements and understandings and the practices pursuant thereto have been and now are to unlawfully restrain trade and eliminate competition in the manufacture and sale of various types of waxed paper, to create a monopoly in the respondent manufacturers, and to place in them the power to control and enhance prices.

Firms Named in the Complaint

Among the manufacturers named in the complaint are those referred to as "regular dues-paying members" of the association. They are Badger Paper Mills, Inc., Peshtigo, Wis.; Ben-Mont Papers, Inc., Bennington, Vt.; Berst-Forster-Dixfield Company, New York City; Crown Zellerbach Corporation, San Francisco, whose waxed paper business is conducted under the trade name of Western Waxed Paper Company; Dixie Waxed Paper Company, Inc., Dallas, Tex.; Kallamazoo Vegetable Parchment Company, Kalamazoo, Mich.; Marathon Paper Mills Company, Menasha, Wis., which conducts its waxed paper business under the name of Menasha Products Company; Mid-West Wax Paper Company, Fort Madison, Ia.; Nashua Gummed and Coated Paper Company, Nashua, N. H.; Pacific Waxed Paper Company, Seattle; Paterson Parchment Paper Company, Bristol, Pa.; Pollock Paper and Box Company, Dallas, Tex.; Rapinwax Paper Company, Minneapolis; Riegel Paper Corporation, New York City; Southern Paper Company, Ltd., New Orleans; the Specialty Papers Company, Dayton, Ohio; Waxide Paper Company, Kansas City, Mo.; West Carrollton Parchment Company, West Carrollton, Ohio; and Karl R. Zimmer and Lorena H. Zimmer, trading as Zimmer Paper Products Company, Indianapolis.

Five Other Respondents

Five other respondent manufacturers are named in the complaint as being "irregular dues-paying members" of the association. They have been irregularly represented at the association's meetings but are alleged to have cooperated in its activities. They are American Tissue Mills, Holyoke, Mass.; Central Waxed Paper Company, Chicago; the Hammersley Manufacturing Company, Garfield, N. J.; Henle Wax Paper Manufacturing Company, Inc., New York City; and Newark Paraffine and Parchment Paper Company, Newark, N. J.

The Ohio Wax Paper Company, Columbus, Ohio, also is named in the complaint as a respondent but is not listed as being a member of the association.

Respondent Members of Board of Governors

Respondent members of the association's board of governors are Donald A. Snyder, Menasha, Wis.; L. O. Turner, River Rouge, Mich.; R. B. Donnelley, Chicago; Leslie L. Jacobs, Dallas, Tex.; A. Southon, Kalamazoo, Mich.; H. O. Nichols, New York; D. C. Hurlburt, Bennington, Vt.; Van H. Wilshire, Dayton, Ohio; J. E. Edelstein, Minneapolis; and Karl Zimmer, Indianapolis.

The respondents are granted 20 days to answer the complaint.

Combustion Gets Three More Awards

Recent awards to plants of Combusion Engineering Company, Inc. include the Maritime Commission "M" pennant to the Heine Boiler Division, St. Louis; a third star for the "M" pennant awarded in 1942 to the company's Hedges-Walsh-Weidner Division, Chattanooga; and an Army-Navy "E" to the company's assembly plant at Savannah, Ga.

In presenting the "M" pennant to the company's St. Louis plant, Allen D. MacLean, director of production of the U. S. Maritime Commission, emphasized the fact that the equipment and supplies requirements for each soldier overseas amounted to 7 tons on landing and 2½ tons per month thereafter. This means that to supply our rapidly expanding overseas forces we must continue the pace of our vast shipbuilding program for some time to come. He pointed out that the 410 ships produced during the first three months of this year brings our total production of ships for the Victory Fleet since Pearl Harbor up to 3061.

The Maritime "M" award was accepted by F. O. Pahmeyer, general manager of the Heine Boiler Division on behalf of the company, and the Merit Badges by C. J. Phelan and D. Walls on behalf of the shop employees.

J. V. Santry, president of Combustion Engineering Company, expressed the company's appreciation of the award. Addresses were made by Mayor A. P. Kaufmann, of St. Louis, and by Commander J. K. Galleher, administrative officer of the Merchant Marine Cadet Corps Academy.

Permitted Uses of Manila Fiber

WASHINGTON, D. C., April 17, 1944—Permitted uses of Manila fiber in the manufacture of certain types of essential papers include the production of electrolytic condenser paper for the manufacture of electrical condensers or capacitors where such paper is required, but such paper must not be heavier than 18 pounds per ream in sheets measuring 24 by 36 inches, the War Production Board's Pulp Allocation Office explained today.

Through an error in Conservation Order M-294, issued March 20, the order read that the use of electrolytic condenser paper "but not less than 24 x 36-18#" made from Manila fibre, was permitted, whereas, the corrected order as amended today reads "but not more than 24 x 36—18#".

Schwartz & Co. 25 Years Old

Schwartz & Co., dealers in paper and twine of all kinds, 523-27 Cherry street, Philadelphia, Pa., are sending greetings to their customers and suppliers on the twenty-fifth anniversary of their organization. The company says: "To you who have made this anniversary possible, we are deeply grateful. We sincerely enjoyed our associations of the past quarter of a century, and hope to merit and receive your continued approval and friendship in the years to come. The accomplishments of the past have been refreshing and strengthening . . . the future we face with assurance and confidence, dedicating ourselves to ever increasing the scope of our usefulness and service."

Parsons & Whittemore Sold

Howard Whittemore has announced that the controlling interest of Parsons & Whittemore, Inc. has been sold by the Whittemore family to Lyddon & Co. The organization will not undergo any change. Mr. Whittemore remains with the company as president and chairman of the board.

Of Lyddon & Co., M. Joseph E. Lyddon, Karl F. Landegger and Robert Grant join the board of directors.

William Flohr, vice president, remains in charge of the pulp department. J. H. Newman, vice president, continues to handle all paper exports. The domestic paper department and the general exports will continue as before.

Eli deVries and Edward R. Southouse desired to resign from the firm but their collaboration is available.

Karl F. Landegger has been appointed executive vice-president.

Lyddon & Co. of New York and London are an old and well-known pulp house who will lend all possible support to the firm and the new set-up is intended to render better service both to the mill principals and to the customers, domestic and overseas.

Manhattan's Victory Gardens Under Way

Manhattan Victory Gardens, the 400 garden project that won the highest award of the National Victory Garden Institute, is now under way for the 1944 season, it is announced by officials of The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J.

Chairman of the Victory Garden Committee, James J. De Mario, advertising manager of Manhattan, says that gardeners are already at work, clearing away old vegetable waste and preparing for fertilizing. In view of the expected food shortage, it is expected that the gardeners will endeavor to better their fine record of last year.

The land for the 10½ acre project is leased by the company. It is divided into plots approximately 20 by 40 feet. On advice of the County Agricultural Agent, it was not necessary to plow again this year, but fertilizer, water supply, tools with an attendant, and a parking lot are provided by the company. The gardeners work the plots at all hours, usually going there immediately after coming off different shifts. From the first the idea met with enthusiastic cooperation on the part of employees, and has resulted in offsetting greatly the shortage of fresh vegetables.

H. B. Brinig to Be Sales Manager

The Claremont Paper Company announces the appointment of Harold B. Brinig to the office of sales manager to succeed the late Willard T. Libby. Mr. Brinig has been with the company for the past ten years handling sales in both the eastern and western territories. Prior to that he was with Brown Company for nearly twelve years, most of the time on paper sales in the Pittsburgh and Chicago offices. Claremont's sales office is located at 342 Madison avenue, New York City.

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger
EDITOR

No. 118 April 20, 1944 No. 16

COMING EVENTS IN PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

CHICAGO PROFESSIONAL PAPER GROUP—First Monday of each month except July and August at Chicago, Ill.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION—25th Anniversary Convention, Edgewater Beach Hotel, Chicago, Ill., May 24, 25 and 26.

MARKETS AFTER THE WAR

Many changes may be expected in the economic structure of the United States following the war. Social changes have already taken place and more are occurring to such a great extent that this alteration in the former pattern of American life must exert a great influence during post-war years. It seems an opportune time for industrial concerns, who have not already seriously considered their future prospects, to inquire into the subject now. A good approach to the subject and a general answer to the question: What will be the position of my business and what can I do to maintain it in post-war years? is discussed in general economic terms in "Markets after the War," issued by the Department of Commerce, the New York Regional Office of which is at 500 Fifth avenue, New York.

Prefacing the text, the foreword states that the booklet is designed to assist market analysts in setting their sights on a common goal of post-war opportunity for American business. Starting with the now widely accepted proposition that a high level of productive employment must be maintained after the war, it seeks to answer three questions: (1) What would total business volume be if most of the people who will want to work after the war do have productive jobs? (2) How does the war affect the possibility of reaching that goal? What will be the magnitude of the accumulated demand for goods? How big a backlog of purchasing power in the form of extra savings? What obstacles must be overcome? (3) What opportunities would such a national market offer your business? Starting with an assumed total volume of business which may be far above the best pre-war year, how can you determine the market potential for your product?

In stating the need for planning by business, the booklet says in part that, "The war is demonstrating the vast productive capacity of this country when the demand exists. The national output has reached a level which few people believed possible three years ago. Stimulated by war demands, a decade of technological development has been crowded into a few months, thus giving promise of further increases in efficiency when these developments are fully utilized for civilian production. There remains the job of distributing an output of civilian goods equal to present wartime production. . . . Business as a whole must assume a large share of the responsibility of preparing for a high level of production and consumption after the war. The Federal Government now buys half the nation's output of goods and services. Such public works planning as is now visualized will not account for more than a fraction of the gap when this large volume of war expenditures is no longer necessary. There is much that the Federal Government can do to facilitate this planning by business, and to create a more favorable environment for the production of more goods for more people at less cost. In large part, however, the planning requires the aggregate effort of thousands of business men each of whom has a detailed knowledge of the problems and possibilities of a particular enterprise."

After discussing the nation's capacity for production and the result of war on post-war markets, the bulletin goes on to state that production makes markets. "From management's standpoint, sales make jobs. It is equally true that production makes markets. . . . Increased production creates purchasing power to absorb the additional output. Business must shoulder the responsibility of translating purchasing power into effective demand. It means that costs must be at levels where people can buy, and quality improvements must be made to create a strong desire for new goods. . . . An adequate flow of investments will be important in maintaining a large output after the war. It is still true, however, that in large part the maintenance of a high level of production will provide the purchasing power to absorb that output."

In reference to the reconversion problem and particularly that of potential versus effective demand, the bulletin states in part: "In the first place there is nothing automatic or inevitable about this post-war market. The market potential that goes with high income, deferred demand, and accumulated purchasing power needs to be translated into effective demand for particular goods or services. A peacetime level of production which approaches the capacity of available manpower after the war means a substantial increase over pre-war standards of living. To reach

this higher standard of living, consumers must be persuaded to buy more things than they have ever had before. This is a challenge to business enterprise. Can the whole gamut of goods and services be made so attractive and can they be sold so effectively that the consumer will be willing to work about the same number of hours as in 1940 (an average of 38.1 per week in manufacturing) to obtain them? This calls for better market analysis, more sales research, more imagination and ingenuity in developing new products or new markets for old ones, more strenuous efforts to improve promotion and distribution methods. This increase in living standards does not mean a uniform increase over the pre-war volume of production, with the same products sold through the same distribution channels to the same income groups . . . There is real danger that business will underestimate these changes and thereby miss vital opportunities."

In conclusion, the booklet stresses the need for a thorough understanding of your company's product. "Without this," it continues, "any management is badly handicapped. . . . Business has demonstrated its ability to produce. Thus the post-war problem becomes largely one of distribution."

Hummel-Ross Profits Up

The Hummel-Ross Fibre Corporation for the 12 weeks of 1944, reports net earnings applicable to common stock totaled $66,711, compared with $38,517 for the like period in 1943. Net sales for the 1944 period aggregated $1,538,290, compared with $953,170 in 1943.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1944		Corresponding Weeks—1943	
March 4	88.7	March 6	89.7
March 11	89.1	March 13	89.8
March 18	92.2	March 20	88.9
March 25	90.3	March 27	90.6
April 1	88.0	April 3	88.6
April 8	92.0	April 10	89.9

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1943	87.2	88.9	89.5	88.7	91.4	84.8	84.3
1944	90.1	90.6	*90.1*	...	...	...	...

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1943	91.0	88.3	89.6	89.6	82.0	87.8

COMPARATIVE YEARLY SUMMARIES

	1937	1938	1939	1940	1941	1942	1943	1944
Year to Date..	89.4	66.3	79.9	85.2	89.6	103.3	88.7	90.4
Year Average..	79.8	71.5	83.4	85.6	97.4	90.4	87.8	...

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apri.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1938	56	63	63	60	60	59	59	69	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	83	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	88	94	94	96	94	89	96	94	94	93	87	93
1944	90	96	*95*	..	..	..	..	..	..	..	..	..	..

Week ending March 4, 1944—95
Week ending March 11, 1944—95
Week ending March 18, 1944—95
Week ending March 25, 1944—97
Week ending April 1, 1944—93
Week ending April 8, 1944—*94*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

EXPORTERS
OF AMERICAN PULP

TO
BRITAIN
SOUTH AMERICA
AND ALL WORLD MARKETS

LYDDON
& COMPANY
(AMERICA) INC.

51 EAST 42ND STREET
NEW YORK CITY

California or Florida?

REGARDLESS of the claims of these rival states . . . the fruit's the thing.

Similarly, in the Paper industry, H&M's Acid Orange Y is the thing. It's the industry standard.

On mill records . . . the brilliancy and money value of H&M Acid Orange Y are approximated by no other type of orange. It possesses excellent solubility and is widely used both as a beater color and calender stain.

It's the universal color for everything from boxboards to tissues. H&M Technical Service will show where its features fit into your line.

And you should also know—		
	Acid Orange RR *For Redder Shades*	**Acid Orange AD** *Specialty for Staining*
	Acid Orange NF *Non-Foaming*	**Crystal Orange 2G** *Yellow Shade—Very Light Fast*

HELLER & MERZ DEPARTMENT

CALCO CHEMICAL DIVISION · · AMERICAN CYANAMID COMPANY

BOUND BROOK, NEW JERSEY

NEW YORK · CHICAGO · PHILADELPHIA · BOSTON

PROVIDENCE · CHARLOTTE

Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY
122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

Stain Reaction of Unbleached and Bleached Groundwood Pulps*

By John H. Graff[1]

Abstract

Unbleached and peroxide bleached groundwood pulps show distinct fluorescent color differentiations with ultraviolet light. The Loften-Merritt stain gives distinct color differentiations between the two types of groundwood, so that microscopic analyses of mixtures of these two pulps can be carried out with a reasonable degree of accuracy.

For commercially peroxide bleached groundwood, these differentiations appear to hold good for many months after the groundwood has been bleached.

Preliminary investigations of unbleached and commercially peroxide bleached groundwood pulps showed that no differentiation could be obtained with phloroglucinol, aniline sulphate, the iodine-iodide-metallic salt stains, the "W" stain, or Texchrome. The Bright stain could not be used because previous investigations *(1)* had shown that a relatively large number of unbleached groundwood fibers stain blue-red, red-blue, or red with this stain.

A study of the fluorescent reaction with ultraviolet light showed some interesting results; e.g., sheets of various samples of unbleached groundwood pulps exhibited fluorescent colors varying from dark purple-drab to dark vinaceous-gray and a sample of bleached groundwood pulp gave a very light vinaceous-gray fluorescent color. However, in mixtures—particularly with other types of fibers or with very lightly bleached groundwood—this differentiation would be very uncertain.

Past experiences with the Loften-Merritt stain *(2)*, however, suggested that this stain probably could be used for the microscopic differentiation of unbleached and bleached groundwoods. Used as described below, this gave very good results with the samples investigated.

The Loften-Merritt stain is prepared by mixing 10 parts of 2% Malachite green, 20 parts of 1% fuchsin, and 3 parts of 0.05 *N* HCl.

Preparation

The fibers are prepared on a slide in the standard manner, the stain is added to the fibers on the slide and allowed to stand for 2 minutes, after which the excess stain is drained off and the fibers are rinsed thoroughly with distilled water. Two or 3 drops of water are added to the slide, the cover glass is put in place, and the water is drained off. Staining can also be carried out directly in a beaker. The fuchsin should be General Dyestuff's Magenta AB powder *(3)*.

This stain gave the following color reactions: Unbleached groundwood: deep blue-violet to pale violet. Commercially peroxide bleached groundwood: amethyst violet to light Hortense violet

To determine the accuracy of the fiber differentiation, the following mixtures were used for fiber analyses:

1. 70% unbleached and 30% bleached groundwood
2. 50% unbleached and 50% bleached groundwood
3. 30% unbleached and 70% bleached groundwood

These analyses showed a standard deviation entirely consistent with accurate fiber analysis and indicated that results can be obtained with a small percentage of error.

The next question was—Would this differentiation persist for a considerable time after the groundwood had been bleached? Therefore the pulps as originally received were dried and stored for 16 months, after which time the brightness of the unbleached sample was 59.2 and that of the commercially peroxide bleached groundwood was 64.7. The fluorescent differentiation of handsheets from the pulps proved to be practically the same as when tested 16 months before, and the stain differentiation with the Loften-Merritt stain also was the same.

Acknowledgment

The results of this investigation are published through the courtesy of the St. Regis Paper Company.

Literature Cited

1. Graff, John H., *Paper Trade J.* 113, no. 13: 100-104 (Sept. 25, 1941).
2. Graff, John H., A Color Atlas for Fiber Identification. Appleton, Wis., The Institute of Paper Chemistry, 1940.
3. Graff, John H., Pulp and Paper Microscopy. Appleton, Wis., The Institute of Paper Chemistry, 1942. See p. 102-108.

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 14-17, 1944.

[1] Member TAPPI; Research Associate, The Institute of Paper Chemistry, Appleton, Wis.

Fundamental Research on Tall Oil and Sulphate Turpentine and Commercial Exploitation of Results*

By Torsten Hasselstrom[1]

Abstract

During the present emergency, tall oil and sulphate turpentine enjoy a market in excess of normal times. Tall oil is chiefly employed to compensate for the more expensive fatty acids primarily used in the manufacture of various kinds of soaps and as a drying oil for cheap paints. It will be noted that this commercial demand follows a similar pattern as in the Scandinavian countries during the last war.

The fundamental chemistry of both tall oil and sulphate turpentine is discussed and special reference made to the fact that the tall oil resin acids are more uniform in composition than those of rosin, and hence, produce high yields of dehydroabietic acid on disproportionation of hydrogen in the highly unstable abietic acid molecule. Evidence is provided that tall oil is not only an excellent raw material for making of this stable resin acid, but it may also serve as a chemical raw material for making of products now manufactured from coal tar. Crude sulphate turpentine renders itself easily to processes for producing of high grade pine oil and other derivatives of terpenes.

The commercial utilization of tall oil and crude sulphate turpentine as novel chemical raw materials is discussed and the suggestion made that it may be to the advantage of the sulphate pulp industry to develop their byproducts along cooperative lines. The establishment of central plants would apparently best permit the industry to capitalize on the potentialities of their byproducts.

Only few raw materials can be utilized by the chemical industry without yielding byproducts which remain of no value until explored through fundamental, industrial and market research. But even when an investigation has shown favorable results, the development of byproducts is often retarded or left unexploited. The policy of most companies is to expand into new fields only where they can utilize their past experiences or individual abilities as they prefer to sell products related to their present output to customers already served.

General emergencies, such as wars, are often instrumental in bringing about new lines of development for old industries. As a consequence, products of little or of no past value suddenly gain importance and are often carried over to the coming peace period to attain a permanent value, or the demand may entirely cease to exist because of the re-entry of old established products or to new discoveries in competitive fields. Predictions which determine the trends governing the value of any given product for long periods ahead are not easy to make. Unpredictable elements, such as new scientific findings, individual enterprise and vogue, may be of far more deciding influence for the success or failure of a product, than protective tariffs, peace treaties, or statistics. Up to the last war, the steel industry was the determining factor in establishing the economic status of individual nations in the commerce of the world. After the peace of 1918, the hegemony of iron and steel was suddenly taken over by the chemical industry and the pulp and paper industry, which created new uses for wood, heretofore undreamed of and regarded as impossible. There is no reason to believe that after this war the importance of cellulose and other products of wood will diminish in importance. Judging from the increased variety of uses for these commodities in ever expanding old and new fields, this trend will be accelerated. It is, therefore, logical to assume that the byproducts of the pulp and paper industry, particularly those of the kraft mills, will demand an ever increased attention.

Present Use of Tall Oil

During the present emergency, tall oil and sulphate turpentine enjoy a demand in excess of normal times. The government encourages kraft mills to recover these products which had previously gone to waste or been used as fuel. Crude sulphate turpentine is refined and used to extend the present dwindling stores of gum spirits and steam distilled turpentine. Tall oil is, in addition to old uses, now chiefly employed as a substitute for the more expensive fatty acids in soap manufacture and as a drying oil for cheap paints.

It is of interest to note that this development closely follows a similar pattern as to the demand of tall oil in the Scandinavian countries during the last war when scarcity of fats and paint thinners were prevalent. Immediately after that war when vegetable oils and rosin again were available, only those kraft mills were able to sustain production of tall oil which did not sell crude tall oil on the open market but used it as a raw material to manufacture other products. The Scandinavian countries in the early twenties established sufficiently high tariffs on vegetable oils of which they are large importers to encourage production and home consumption of tall oil. During the years of peace following, it served as a substitute for fatty acids in a variety of industries, mainly for soap stock and drying oils. The great expansion of the kraft paper industry in these countries, however, caused a constant surplus of tall oil which they dumped at low prices on the foreign markets. This procedure discouraged the recovery of kraft byproducts in various countries including the United States. Accordingly, there were not sufficient pertinent reasons to spend money and effort for the development of byproducts which were obtained in com-

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 14-17, 1944.

[1] Director of Research, G. & A. Laboratories, Inc., Savannah, Ga.

paratively small quantities; about 1 to 2% of the total value of marketable output produced and which would serve only as substitutes.

Composition

On first sight, crude sulphate turpentine and tall oil are in and by themselves not attractive products, even in a chemical sense. American tall oil contains a somewhat larger amount of resin acids than the Scandinavian product; it being approximately 50 to 55% of resin acids, 30 to 45% of fatty acids and about 8 to 10% of unsaponifiables. The value of the crude tall oil soap for the sulphate pulp mills is represented by its fuel value and its content of sodium salts which are reused in the pulping process. It is understood that when wood, rich in resins is employed for the manufacture of kraft pulp, the surplus crude tall oil soap is definitely undesirable because it causes excess foaming in the evaporators. Therefore, in the not too distant past, some mills were compelled to discard some of it as waste material of no value whatsoever, to secure normal processing conditions for their soda recovery.

The resin acids originate from the heartwood; the fatty acids and the main part of the unsaponifiables from the sapwood of the pine tree. The resin acids of tall oil are a mixture of Steele's abietic acid and probably a small quantity of *d*-pimaric acid though not yet identified. Hence, the resin acids of tall oil differ from the resin acids of ordinary pine tree rosin, in which the abietic acid part is a mixture of primary abietic acids in various stages of transformation together with 15 to 30% of *d*-pimaric acid.

Steele's abietic acid of all the known resin acids, is the most unstable to atmospheric oxidation. This explains the technically inferior quality of the resin acids of tall oil in comparison with ordinary gum or wood rosin acids. The chemistry of the resin acids of tall oil has only recently been made understandable to the organic chemist. The complicated nature of this chemistry has up to the present time greatly retarded the full utilization of this material as well as of ordinary pine tree rosin.

The tall oil fatty acids are a mixture of unsaturated fatty acids similar to those commonly encountered in vegetable matters, viz.: linoic acid, oleic acid, linoleic acid, ricinolenic acid, together with small amounts of high molecular fatty acids. Scandinavian tall oil contains palmetic acid which, however, is partly a secondary product because of the action of the alkaline cooking liquor on the oleic acid originally present in sapwood.

The unsaponifiables of tall oil contain abundant quantities of sterols of which 22-dihydrostigmasterol is one of the primary constituents together with lignoceryl alcohol and other high molecular hydroxy compounds which apparently comprise the oil soluble vitamins of the pine tree.

Crude sulphate turpentine because of its mercaptan content, cannot be used to replace gum spirits or steam distilled turpentine as paint thinner, in shoe polish, etc., without refining. Crude or refined tall oil because of its highly unsaturated fatty and resin acid content is not suitable for the complete replacement of tallow, vegetable oils, or rosin in laundry soaps, nor for use alone as a drying oil, although it may be used as an extender but only in such amounts as may not cause serious deterioration in the final products.

The technical processes for refining of sulphate pulp byproducts here and abroad have almost exclusively comprised methods of distillation and in simple methods to improve the odor and color of turpentine and to raise the fatty acid content of tall oil.

Outlook

Will the recovery of the byproducts of the sulphate pulp industry in the United States during the coming peace period continue to follow the same pattern as in the past in the Scandinavian countries? In order to answer this question, the potentialities of tall oil and sulphate turpentine as chemical raw material must be known.

Alongside the industries producing Naval stores, animal fats, and vegetable oils, the byproducts of the sulphate pulp industry is the largest potential source of fatty acids, resin acids, and turpentine. If it is necessary to continue to develop tall oil and sulphate turpentine commercially only as substitutes or extenders for old established products, it is only too obvious that when labor again becomes abundantly available and imports unrestricted, the importance of these byproducts will rapidly decrease. Only such outlets for tall oil and sulphate turpentine will remain where they were introduced into specialties.

On the other hand, if it is realized that these byproducts represent novel chemical raw materials: a new source for fats, resin acids, and terpenes, which can be produced at low costs involving inexpensive equipment and little labor, the outlook is entirely different.

The progress made in fundamental research in the adjacent fields of rosin, terpenes, and in organic chemistry generally during the last decade has greatly increased the understanding of the byproducts of the kraft process. Without exaggeration, it should be emphasized that tall oil is a chemical raw material with so diversified possibilities that it easily surpasses many other known commodities. This has been brought about not by the research laboratories of the sulphate pulp industries, but by individual scientists, universities, and industrial laboratories throughout the world including those in this country.

The work on the constituents of rosin and turpentine show that the resin acids of tall oil are superior to ordinary gum and wood rosin as a raw material for making of products from abietic acid. The pure fatty acids of tall oil compare well with the high grade fatty acids from any other vegetable oil. Likewise, crude sulphate turpentine is an excellent material for making of products from turpentine. In order to fully utilize the possibilities of tall oil, the constituents were separated and the isolated components investigated.

Separation of Resin Acids from the Fatty Acids of Tall Oil

When freed from water, American crude tall oil rapidly forms a semi-solid mass on standing. This procedure may be accelerated by stirring and cooling to below room temperature. The solids and liquids may be separated by filtration, whereby a considerable part of resin acids originally contained in the crude is collected in form of a press cake *(1)*. Recent tests by manufacturers have shown that this method of separation is economically sound. The liquid part is dark in color and contains about 35 to 45% of resin acids, and constitutes a refined tall oil which may be used as a flotation reagent *(2, 3)*. Such refined tall oil may also be subjected to additional re-

fining by means of distillation in vacuum, in which case larger yields of distilled refined tall oil are obtained than when ordinary crude is subjected to distillation without previous filtration.

The solid press cake contains Steele's abietic acid, in addition to small amounts of saturated fatty acids and some ligneous matter *(4)*. On crystallization, the abietic acid can easily be obtained in high purity and in high yields *(5)*. It is of significance that the tall oil resin acids in crude or refined form, are not only more uniform in composition than the resin acids of gum and wood rosin, but are apparently devoid of *d*-pimaric acid.

The fatty acids of the press cake contain saturated acids of higher molecular weight than stearic acid of which a new one has been isolated from the mother liquors obtained in the crystallization process of abietic acid of the press cake *(4, 6)*. Even this fact is of technical interest since such higher saturated fatty acids belong to a group of acids which commonly occur in natural waxes.

Crude sulphate pulp or liquid refined tall oil is easily selectively esterified with aliphatic primary alcohols. The reaction proceeds very smoothly, for instance in the presence of methanol when no more than about 10% is needed to obtain complete esterification of the fatty acids *(7)*. From such partly esterified tall oil the resin acids are conveniently removed in batch or continuous operation by extraction with dilute sodium hydroxide solution in the presence or absence of a water immiscible solvent *(8)*. The resin acids are removed in the aqueous layer as water soluble sodium salts. Such a resinate solution may be used as an emulsifier in soaps, size, etc., or with the resin acids may be regenerated by treating the resinate solution with a mineral acid.

The Fatty Acid Fraction of Tall Oil

The crude methylester fraction of crude tall oil is reddish brown in color and contains appreciable amounts, 5 to 15%, of unsaponifiables. This product may be subjected to catalytic hydrogenation at moderate pressure after pretreatment with active reagents to remove sulphur, to yield the methyl ester of stearic acid of high purity *(8)*. In order to remove the bulk of unsaponifiables the crude tall oil esters may be distilled in vacuum, whereby fatty acid esters of very high purity are obtained in the distillate, unsaponifiables remaining in the residue. On hydrogenation, such distilled esters yield without any pretreatment, almost theoretically pure stearic acid methyl ester *(9)*. These results show that the fatty acids of tall oil are easily separated from resin acids and can be refined into high grade products, which could serve to compensate a considerable part of the demand for fatty acids, both in time of peace and in war.

The unsaponifiables of tall oil contain, except for still unexplored vitamins, sterols, and high aliphatic alcohols. In the sterols fraction of tall oil, 22-dihydrostigmasterol has been isolated *(10, 11, 12)* in amounts of about 3 to 8 % and has, like the other sterols, been subjected to comprehensive fundamental chemical investigations during the last fifteen years. One of the most interesting results of these studies is the use of the tall oil sterol as starting material to make the male sex hormone, androsterone, synthetically. Another important feature is that this sterol on irradiation is converted into an antirachitic vitamin, however, of much less potency than ergosterol.

Of the higher aliphatic alcohols, lignocerylalcohol has been isolated in Scandinavian tall oil, but not yet described as present in American tall oil.

Resin Acids of Tall Oil

It should be emphasized that the resin acids of tall oil are different from those of gum and wood rosin. The abietic acid of tall oil is the most unstable of all known resin acids and, hence, is unsuitable to replace gum and wood rosin, particularly for uses where resistance to light and air is desirable. This property of Steele's abietic acid in tall oil causes discoloration when used in soaps, varnishes, etc. The instability is caused by the conjugated system of unsaturation contained in the molecule of abietic acid. Recently, it was discovered that abietic acid, through disproportionation of hydrogen, could be transformed into a stable product *(13, 14)*. When the tall oil resin acids are subjected to heat treatment in the presence or absence of catalysts *(15)*, the resultant product contains more dehydroabietic and dihydroabietic acid than gum or wood rosin treated in the same manner *(16, 17, 18, 19)*. This finding is of considerable technical importance, since dehydroabietic acid has the benzenoid nucleus and hence, may be subjected to all reactions of the aromatic series of coal-tar, such as sulphonation, nitration, Friedel-Craft reactions, etc.

The tall oil resin acids yield about 70 to 80% dehydroabietic acid on such catalytic treatment, whereas the best results so far obtained by us on gum and wood rosin is about 38 to 50%.

Crude stabilized tall oil resin acids are easily refined to a product of water white color and of high melting point, and is an excellent raw material for making of esters, ester gums, and types of artificial resins, all of which differ from the corresponding compounds made from gum and wood rosin, inasmuch as they are of higher melting point and stable to the atmosphere.

On sulphonation, dehydroabietic acid yields the 6-sulphodehydroabietic acid *(20-29)*. This is an interesting compound and shows promises as a pigment carrier for paints. Other practical applications, such as detergents, as intermediate in chemical industry, etc., have been explored superficially *(30)*.

The dehydroabietic acid is easily nitrated to form a dinitroabietic acid which recently has been found to be the 6, 8-derivative *(31, 32)*.

On acetylation, according to the Friedel-Craft reaction, the 6-acetyldehydroabietic acid is obtained. It has been converted into physiologically active compounds of the female sex hormone type *(33)*.

Similarly to gum and wood rosin, crude or refined tall oil resin acids are easily converted into hydrocarbons. The resultant product is a complicated mixture of hydrogenated phenanthrene homologs which show many interesting chemical properties. It was recently discovered by Vasilev *(44)* and independently by the author *(45)*, that when this hydrocarbon mixture is cracked in the presence of catalysts, the result is a mixture of aromatic hydrocarbons, commonly occuring in coal tar, together with valuable hydrogenated derivatives of same. The compounds identified in the cracked material include propylene, benzene, toluene, xylene, cumene, trimethylbenzenes, tetraline and methyltetraline, pentane and iso-pentane, isohexane, decaline, methyldecaline, menthanes, etc. The fact that the resin acids of tall oil may be converted into such variety of hydrocarbons offers the

most alluring possibilities to the organic chemist for the production of valuable products, which heretofore have been derived from other sources. The constituents of tall oil may well in the future serve as a raw material for making of plastics, dyes, pharmaceuticals, Nylon types of artificial silk, alcohols, explosives, solvents, etc.

When the resin acids are subjected to decarboxylation and dehydrogenation in the presence of convenient catalysts, retene, methylisopropylphenanthrene is obtained and has been extensively investigated. It may show promise for uses as an initial material for dye stuffs *(34)*, and pharmaceuticals *(35)*. Recently, this hydrocarbon has by means of a specific catalyst, been converted into propylene and methylphenanthrene which may be developed as an intermediate for pharmaceutical products, dyes, etc., *(36, 37, 38)*.

Sulphate Turpentine

Crude sulphate turpentine is, at the present, recovered by most kraft paper plants. It is purified by chemical means and fractional distillation to produce the refined sulphate turpentine of commerce. The refined sulphate turpentine is competitive to gum spirits and steam distilled turpentine, and hence, subjected to great market fluctuations, which during the last ten years have varied between 17 to about 75 cents per gallon.

Crude sulphate turpentine lends itself easily and with equal yields as gum spirits and steam distilled turpentine to processes for producing synthetic pine oil *(39, 40)*. When crude sulphate turpentine is treated with dilute sulphuric acid in the presence of effective emulsifying catalysts, it yields about 70 to 75% terpenhydrate, which is easily converted into high grade terpeneol; the chief constituents of ordinary pine oil. During this treatment, the mercaptan odor disappears and the terpeneol obtained cannot be distinguished from corresponding material made from gum spirits or steam distilled turpentine, thus making sulphate turpentine an excellent material for producing this commodity. The residues obtained in this treatment are rich in monocyclic terpenes which make them a suitable raw material for making of cymene and its derivatives including menthol and carvomenthol; they may also be sulphonated to yield sulphonic acids which may find its way as cheap emulsifiers.

Crude sulphate turpentine may also be chlorinated to produce stable, solid perchloroterpenes and polychlorotoluenes to be employed as insecticides, etc., *(40)*.

Among other products, for which turpentine may be used as a raw material, is allo-ocimene and myrcene for which recently great interest has been shown as constituents of a novel type of synthetic rubber of different properties than those made from petroleum derivatives *(42, 43)*.

Other byproducts of the sulphate mill, such as methanol, furane derivatives, etc., are not utilized, but could easily be recovered together with the crude sulphate turpentine.

Conclusions and Recommendations

During the last twenty years, knowledge about the fundamental chemistry of the byproducts of the sulphate pulp industry has greatly expanded. The abietic acid, which in the past has represented the greatest obstacle for the understanding and consequently for any successful commercial development of tall oil, has now been shown to be one of the most promising new raw materials for future industrial exploitation. This change of concepts has been brought about mainly by the discovery that the unstable abietic type of the pine tree resin acids is easily converted into dehydroabietic acid. Being one of the least expensive of the organic acids in manufacture, it is not difficult to visualize that this benzenoid type of acid and products made therefrom, will enjoy an ever increasing demand. The resin acids of tall oil will undoubtedly play an important role in this development since they produce the highest yield of dehydroabietic acid known, as compared with gum or wood rosin.

In the laboratory, the complete separations of the constituents of tall oil into fatty acids, resin acids, sterols, and alcohols is merely a routine operation. To accomplish this on a commercial scale will not offer greater difficulties than ordinarily encountered when chemical processes are being reduced to practice, the success or failure of which will always depend ultimately on the skill, experience, and foresight of the chemist and engineer. It is believed that only when this step is taken and problems overcome can a sulphate pulp byproducts' industry be solidly established.

The producers of fats and Naval stores are the natural competitors to tall oil and sulphate turpentine. It is believed, however, that gum and wood rosin pine tar as well as gum spirits, steam distilled, and d.d. turpentine, will always have their given place as important commodities. They have, except in exceptional cases, never been able to assume the position as true chemical raw materials, in the same sense as crude oil, coal tar, or cellulose; all of which is easily understood, considering that no true chemical industry can advantageously and without involving great economic risks be based on raw materials which have always shown such great price fluctuations as rosin and turpentine. Crude tall oil and crude sulphate turpentine should be able to satisfy this fundamental requirement, namely stability of cost of production.

Fats, vegetable oils, and Naval stores are far more expensive to produce than crude tall oil or crude sulphate turpentine. This still further emphasizes the favorable prospects for a more thorough utilization of sulphate pulp byproducts. It would be logical to assume that should these byproducts be employed for making of chemicals, they would not be in direct competition with the above mentioned industries, but would rather serve as a welcome supplement. Such a development is often experienced with the introduction of a new commodity. As for instance, rayon is not regarded as a substitute for silk, but has assumed a place in world commerce alongside with cotton, silk, and wool and, in addition, has extended the employment of these types of textiles.

The average kraft pulp mill produces less than a carload of crude tall oil per day, and seldom more than 8,000 gallons of crude sulphate turpentine every 4 days. This small quantity cannot serve as an inducement for a mill to go in for any large comprehensive development of byproducts. It is, therefore, hardly possible nor would it be economical for any one sulphate pulp plant alone to tackle the development of their byproducts to utilize all the potentialities possible these products offer in the chemical sense.

Large chemical concerns may realize the potentialities of kraft mill byproducts and become inter-

ested in the development of tall oil and sulphate turpentine as peace time propositions, since they would be able to rely on past experience in manufacturing and selling of chemicals, have a veteran staff of chemists and engineers and in addition will have possibly idle equipment. However, it is believed that such a trend would not greatly benefit the kraft pulp industry since then the industry would be compelled to continue to sell their byproducts on a competitive market at low prices with no possibilities to capitalize on the ever expanding potentialities of their byproducts.

The sulphate pulp industry has experienced the benefits which arise from cooperation. The great expansion of the kraft mills with the extension in the uses of containers and board has not been the results of the efforts of any one mill but of those of the whole industry. It would, therefore, be wise to assume that the kraft mills should find it to their advantage to develop their byproducts along cooperative lines, which in this case, would mean the establishment of central plants. Such a central plant or plants organized as a separate industry could be capitalized by the different kraft mills themselves; their object would be the use of crude tall oil, crude sulphate turpentine, and possibly other sulphate mill byproducts as raw materials for making less competitive high grade chemicals and the sale of the manufactured products.

Such central plants, owned by the kraft mills themselves, would enable the industry to enjoy full benefit of the possibilities offered by their byproducts. Furthermore, an organization of this kind would be in the position to avoid more conveniently than any individual plant, the overproduction of these byproducts when crude or refined tall oil and sulphate turpentine will, with the coming peace, have to compete with those commodities they now strive to substitute or replace.

Literature Cited

1. Hasselstrom, U. S. Patent No. 1,986,815.
2. Ibid., U. S. Patent No. 1,986,816.
3. Ibid., U. S. Patent No. 1,986,817.
4. Hasselstrom and Bogert, *Journal Am. Chem. Soc.*, 57, 2120 (1935).
5. Hasselstrom, U. S. Patent No. 2,190,660.
6. Hasselstrom and Lewis, Unpublished results.
7. Hasselstrom, *Paper Trade J.*, July 8, 60 (1926).
8. Ibid., Application on file with the U. S. Patent Office.
9. Ibid., Application on file with the U. S. Patent Office.
10. Sandquist and Gorton, *Ber. deutsch. Chem. Ges.* 63, 1935 (1930).
11. Bengtsson, *Z. Physical Chem.*, 237, 46 (1935).
12. Hasselstrom and Hampton, *Journal Am. Chem. Soc.*, 63, 111 (1941).
13. Brennan, Cairncross, Hasselstrom and Hull, U. S. Patent No. 2,272,628.
14. Hasselstrom, U. S. Patent No. 2,311,386.
15. Ibid., U. S. Patent No. 2,344,762.
16. Hasselstrom and Brennan, U. S. Patent No. 2,299,577.
17. Hasselstrom, Applications on file with the U. S. Patent Office.
18. Hasselstrom, Brennan and McPherson, *Journal Am. Chem. Soc.*, 60, 1267 (1938).
19. Hasselstrom, McPherson and Hopkins, *Paper Trade J.*, Jan. 25 (1940).
20. Hasselstrom and McPherson, *Journal Am. Chem. Soc.*, 60, 2340 (1938).
21. Hasselstrom, Brennan and Hopkins, ibid., 53, 1769 (1941).
22. Hasselstrom, U. S. Patent No. 2,121,132.
23. Ibid., U. S. Patent No. 2,121,033.
24. Ibid., U. S. Patent No. 2,121,616.
25. Ibid., U. S. Patent No. 2,230,035.
26. Ibid., U. S. Patent No. 2,225,245.
27. Ibid., U. S. Patent No. 2,288,804.
28. Ibd., U. S. Patent No. 2,288,805.
29. Ibid., U. S. Patent No. 2,223,926.
30. Hasselstrom and Hopkins, *Journal Am. Chem. Soc.*, 63, 421 (1941).
31. Fieser and Campbell, ibid., 69, 159 (1938).
32. Campbell and Morgana, ibid., 63, 1838 (1941).
33. Fieser and Campbell, 61, 2528 (1939).
34. Hasselstrom and Bogert, *Journal Am. Chem. Soc.*, 57, 1579 (1935).
35. Cassaday and Bogert, ibid., 63, 703 (1941).
36. Hasselstrom, ibid., 63, 1164 (1941).
37. Ibid., 63, 2527 (1941).
38. Hasselstrom and Todd, ibid., 64, 1225 (1942).
39. Hasselstrom, U. S. Patent No. 2,330,579.
40. Ibid., Application now on file with the U. S. Patent Office.
41. Hasselstrom and Hampton, U. S. Patent No. 2,337,043.
42. Goldblatt and Palkin, *Journal Am. Chem. Soc.*, 63, 3517 (1941).
43. Palmer, *Ind. Eng. Chem.*, 34, 1029 (1942).
44. Vasilev, *Chemical Abstracts*, 37, 4913 (1943).
45. Hasselstrom and Aaron, Unpublished results.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Harold A. Bergstrom, chief chemist, The Container Company, Glenn Street, Van Wert, Ohio, a 1926 graduate of Renssalaer Polytechnic Institute.

Maurice Deutsch, consulting engineer, 35 Maiden Lane, New York, N. Y., a 1906 graduate of Columbia University.

C. L. Gillespie, special representative, Carnegie-Illinois Steel Corporation, 569 Frick Annex, Pittsburgh, Pa., a 1903 graduate of Cornell University.

Roy D. Heymann, Manager, pulp division, Wm. L. Gilbert Clock Corporation, Winsted, Conn.

Julius Klausner, Jr., general manager, the Cofax Corporation, 3632—34th street, Long Island City 1, N. Y.

Frank S. MacDonald, production manager, J. R. Booth, Ltd., 6 Booth street, Ottawa, Ontario, Canada, a 1925 graduate of Nova Scotia Technical College.

S. C. Nagel, development chemist, Lauxite Corporation, Lockport, N. Y., a 1931 graduate of Princeton University.

Frank T. Peterson, Engineer, Industrial Control Engineering Division, General Electric Company, 1 River Road, Schenectady, N. Y., a 1942 graduate of Syracuse University.

Richard W. Porter, application engineer, The Brown Instrument Company, Wayne & Roberts avenues, Philadelphia 44, Pennsylvania, a 1936 graduate of the University of Washington.

Ernest H. Robinson, chief chemist, Johnson & Johnson, 4949 West 65th street, Chicago 38 Ill., a 1927 graduate of the University of Chicago.

George R. Sears, research associate, Institute of Paper Chemistry, Appleton, Wis., a 1936 graduate of the University of Wisconsin.

Herman C. Selya, chemical engineer, Colloids, Inc., 394 Frelinghuysen avenue, Newark 5, N. J., a 1929 graduate of Northeastern University.

Gordon K. Storin, Research Chemist, Niagara Alkali Company, Buffalo avenue, Niagara Falls, N. Y., a 1937 graduate of International Correspondence School.

Herman R. Thies, assistant manager, research and New Product Development, Goodyear Tire and Rubber Company, Akron, Ohio, a 1920 graduate of the University of Chicago.

Harris O. Ware, technical service Engineer, Paper Makers Chemical Division, Hercules Powder Company, Kalamazoo, Mich., Western Michigan College.

Fernand H. Willemain, chief engineer, American Writing Paper Corporation, 9 Main street, Holyoke, Mass., a 1916 graduate of Mississippi State University.

Lawrence Wineburgh, color chemist, Calco Division, American Cyanamid Company, Bound Brook, N. J.

K. F. Wrangell, industrial engineering developments, E. B. Eddy Company, Hull, P. Q., Canada, a 1922 graduate of Horten Technical College.

Newsprint Consumption in March

Daily newspapers reporting to the American Newspaper Publishers Association consumed 201,708 tons of newsprint paper in March 1944 compared with 237,111 tons in 1943 and 258,518 tons in 1941.

Limits of Effect of Acid Concentration–Digester Pressure Relation in Sulphite Pulping*

By W. F. Holzer[1]

Abstract

The benefits of more rapid cooking or any of its variations realized by use of high strength acid in the sulphite digester are well known, but the fact that the pressure capability of the digester is the limiting factor of these returns has not been emphasized. For a given pressure and temperature there is an optimum strength of acid. Above this strength the benefits are lost in relief. Below this strength the chemical cannot take full advantage of the pressure possibilities. Both from the experimental work and observation of commercial operation, it appears that a shortening of the cook can be realized by increasing pressure provided that the acid strength is adequate to take advantage of the pressure.

There are two common ways to increase the rate of a chemical reaction, by raising the temperature or by increasing the concentration of the reactants. In many reactions it is of little importance which method is used. However, in the case of pulping wood by the acid process, where elevated temperatures are injurious both to pulp strength and yield, it would seem desirable to use the latter method. This has been recognized, at least in some quarters of the paper industry, for many years. *(1, 2, 3).*

In a sulphite cook the chemical whose concentration controls the rate of reaction is, of course, sulphur dioxide, which being a gas, tends to escape from the system especially at temperatures above boiling water. Pressure on the system is required to retain the gas, the greater the pressure the higher the concentration of gas that can be retained. The equilibrium of the system $SO_2 - CaO$ – water at various pressures and temperatures has received careful study *(4).*

In the several excellent papers on this subject attention has been focused on the strength of the initial acid, the time of cooking, properties of resulting pulps, and in some cases the pressure of the cook, especially at higher than usual pressure. Little study was made on the change of acid concentration in the digester during the cook, which in final analysis is the basic consideration of the subject. Obviously a given pressure can retain only a certain amount of SO_2 at cooking temperature. Using a pressure greater than necessary to retain the chemical placed in the digester is wasted effort. Using an acid stronger than can be retained by the pressure allowed in the digester means a loss in the value of the acid concentration.

There has been a trend over a period of years toward taking advantage of the principles of chemical concentration through the use of stronger acid. Impetus to this trend has of course been given by improved equipment such as pressure towers and accumulators. It seems timely, then, that some exploration of the limiting possibilities of the use of acid concentration be made.

Scope

The work described in this paper is limited to the regions of present commercial practice and only slightly beyond them, and a specific example of an instance of commercial application is given.

It is probable that, with few exceptions, present digesters are limited to 100 pounds working pressure or less, and that on the outside an efficient acid plant with a pressure tower could maintain an acid of 7.5 to 8.0% total SO_2. Knowing these limits, a logical question is: Can an acid of 8.0% total SO_2 take full advantage of a digester pressure of 100 pounds, or vice versa?

To increase digester working pressure by a large amount, or to prepare an acid much stronger than 7.5% total SO_2 would require a rather extensive change in equipment. A second question arises: What benefits could be obtained by increasing working pressure a reasonable amount, and how strong an acid could then be used?

To obtain some information on these questions, series of cooks were made in two ranges, one at maximum digester pressures of 95 pounds with acid strengths in the range of 6.0 to 8.75% total SO_2 and the second at maximum pressures of 110 pounds with acid strengths in the range of 8.0 to 11.5% total SO_2. In all cases maximum temperature was constant at 135° C. and combined SO_2 was constant at 1.25%. The same temperature curve was used throughout, a uniform rise to maximum in 4.5 hours, and this maximum maintained for the balance of the cook. Pressure rose to maximum as temperature was being raised, and then was relieved until temperature reached maximum. There was then no further relief until the blowdown which started 1.25 hours before the end of the cook. Total time for all cooks at 95 pounds pressure was 8.5 hours, for all 110 pound cooks 7.75 hours.

Equipment

All cooks were made in a stainless digester having a pulp capacity of 30 pounds, and cooked with an indirect heating, forced circulation system. Cooking conditions, that is temperature and maximum pressure, were controlled by instruments. Pulp was screened on a four-plate flat screen using 0.006-inch cut plates. Standard TAPPI equipment was used for physical tests. Freeness was determined with a Canadian standard instrument.

Cooking Procedure and Testing

Sufficient commercial chips of Western hemlock were taken at one time for an entire series, and stored

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 14-17, 1944.

[1] Associate Member TAPPI; Chief Research Chemist, Experimental Pulping Division, Central Technical Department, Crown Zellerbach Corp., Camas, Wash.

in closed containers. Acid was made up in a stainless steel accumulator using a commercial Jenssen tower acid and relief from the previous cook. Strength was adjusted with liquid SO_2. The digester was entirely filled with chips, and acid was pumped in to completely fill and build up a hydrostatic head of 10 pounds. Cooking was carried on as previously described. Pressure was relieved during the last 1.25 hours to 30 pounds, and the charge blown into a blow pit.

Tests on the cooking acid were made by the Palmrose method *(5)*. During the progress of the cook acid samples were removed through an efficient condenser, and tested by the Haug method *(6)*. Samples were taken when maximum temperature was reached and relief stopped, at the middle of the period of maximum temperature, at the start of the blow down, and just prior to the blow. In all 110 pound cooks an additional sample was taken when maximum pressure was reached and relief started.

Bleachability of pulps were determined by TAPPI Standard T 214 m-42, and are reported as per cent chlorine. Strength was developed in a Valley beater according to TAPPI Standard T 200 m-43, and handsheets were made and tested according to TAPPI Standard T 205 m-40.

Results

Acid Concentration in the Digester

Tests of acid strengths during the progress of the 95 pound cooks are given in Table I-A and are graphed in Fig. 1. It might be expected that, when

TABLE I.—ACID CONCENTRATIONS IN THE DIGESTER DURING THE COOK

A. Pressure 95 Pounds

	Total	Combined	Total	Combined	Total	Combined
Initial	6.06	1.23	7.58	1.24	8.78	1.27
At 4.5 hours (max. temp.)	4.18	0.70	5.00	0.74	5.10	0.64
At 6.0 hours	3.68	0.40	3.92	0.34	4.00	0.38
At 7.25 hours (start blow down)	3.40	0.31	3.54	0.28	3.40	0.28
At 8.5 hours (blow test)	0.86	0.18	1.02	0.18	0.70	0.16

B. Pressure 110 Pounds

Initial	8.07	1.24	9.95	1.26	11.60	1.24
Start of relief	6.10	0.70	7.64	0.86	8.44	0.78
At 4.5 hours (max. temp.)	5.48	0.60	5.80	0.58	5.88	0.54
At 5.5 hours	4.80	0.36	5.06	0.38	4.75	0.35
At 6.5 hours (start blow down)	4.44	0.28	4.43	0.31	4.56	0.24
At 7.75 hours (blow test)	1.34	0.21	1.25	0.23	0.98	0.16

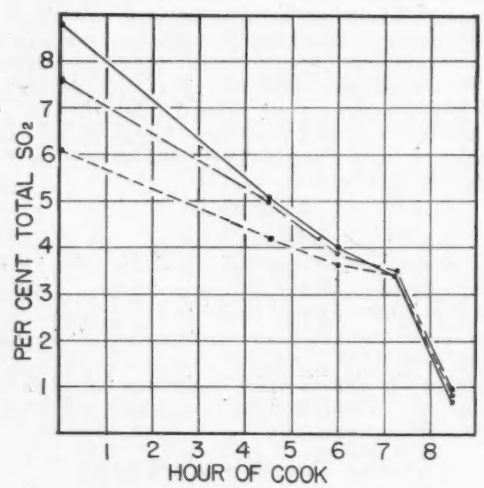


Fig. 1
Acid Concentration During Cook — Pressure 95 Lbs.

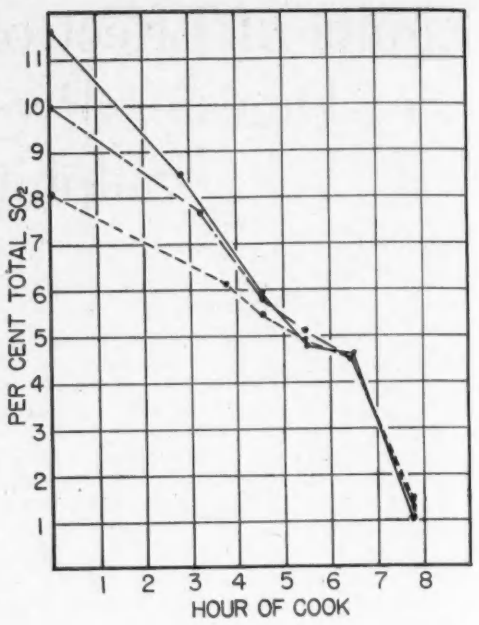


Fig. 2
Acid Concentration During Cook — Pressure 110 Lbs.

relief stopped due to attainment of maximum pressure, a constant acid concentration would be obtained for a given temperature and pressure regardless of initial concentration. This was not the case. Only 4.18% SO_2 remained of an acid starting with 6.06%; whereas 5.00 and 5.10% remained from the two stronger acids starting at 7.58 and 8.78% respectively. This seems best explained by the possibility that the smaller amount of relief available in the first case was not sufficient to sweep out all the air held in the chips and released during the penetration period.

The difference between 4.18 and 5.10% then represented the partial pressure of nitrogen remaining in the digester. The close agreement of the latter two cooks suggested that the true equilibrium of SO_2 over water had been reached. So far as amount of SO_2 remaining in the digester at equilibrium was concerned, it appeared that an acid with 7.5 to 8.0% total SO_2 of which 1.25% was combined was the strongest that could be used with 95 pounds pressure and a temperature of 135° C.

After temperature reached maximum there was no further relief until the blow down, and decrease in chemical in that period was due to combination with the lignin. Since all cooks dropped to a constant value, 3.4 to 3.5%, more chemical was consumed in the cooks starting with stronger acid. Bleach demand, to be discussed later, decreased in regular order of increasing chemical consumption, which confirmed a more thorough lignin removal with increased chemical usage.

The blow tests were on the high side, but this is a mechanical matter and a number of things could be done to improve chemical recovery.

In the series using 110 pounds pressure (Table II-B, Fig. 2) the same general trends were noted, and due to the higher strength acids new points appeared. The first acid test was taken when maximum pressure was reached and relief started. Difference in acid

TABLE II.—COOKING CONDITIONS AND PULP CHARACTERISTICS

A. Pressure 95 Pounds

Maximum temperature, °C.	135	135	135
Maximum pressure, lbs.	95	95	95
Total time, hrs.	8.5	8.5	8.5
Initial acid total SO_2, %	6.06	7.58	8.78
free SO_2, %	4.84	6.34	7.51
combined SO_2, %	1.23	1.24	1.27
Bleach demand, % Cl_2	11.2	8.8	8.0
Screened pulp yield, %	46.5	46.8	46.5
Screenings, %	1.8	1.3	1.5

B. Pressure 110 Pounds

Maximum temperature, °C.	135	135	135
Maximum pressure, lbs.	110	110	110
Total time, hrs.	7.75	7.75	7.75
Initial acid total SO_2 %	8.07	9.95	11.60
free SO_2 %	6.83	8.69	10.36
combined SO_2 %	1.24	1.26	1.24
Bleach demand, % Cl_2	8.5	7.7	6.5
Screened pulp yield, %	47.5	47.2	47.7
Screenings, %	0.6	0.75	0.6

test between the start of the cook and start of relief was due to penetration of the chemical into the wood, and to dilution of the acid by the wood moisture. Since the wood moisture was the same in all cases, the dilution factor would be nearly constant. Differences in acid test should therefore reflect the amount of chemical absorbed by the wood in each case. The decrease in acid tests were 1.97, 2.31, and 3.16% for the respective initial acids of 8.07, 9.95, and 11.60%. There was little difference in the first two, but a marked increase in the case of the strongest acid.

At the end of the relief a small difference was found in the equilibrium acid concentrations, the weakest acid having 5.48% SO_2 left, and the two stronger ones 5.80 and 5.88% respectively. Here even the weakest acid had a large volume of relief and very nearly swept all the air out of the digester.

At the start of the blow down all cooks had again come to a common concentration in the range of 4.43 to 4.56%. The amount of chemical absorbed from the liquor during the cooking period was approximately constant, but when the amount absorbed during the penetration period was added, the total amounts used were in direct proportion to the initial concentration and in inverse proportion to the bleach demands of the pulps. In these stronger acids the differences in amount of chemical left in the digester at equilibrium diminished, but the differences in amount absorbed in penetration was large.

Rate of Cooking

Since cooks at a given pressure were duplicates except for acid concentration, the difference in bleach demands of the pulps was a measure of the difference in rates of cooking. In the 95 pound cooks, the bleach demands (Table II-A) were in uniform inverse proportion to the concentrations of the acid left in the digester when maximum temperature was reached. In ascending strengths of initial acids the bleach demands were: 11.2, 8.8, and 8.0%, and the respective equilibrium acids will be recalled as 4.18, 5.00, and 5.10%. As already pointed out more sulphur was consumed from the stronger acids during the cooking period, and lignin removal was proportionately greater.

The rate of cooking did not show the same leveling off in the 110 pound cooks (Table II-B). As already pointed out the difference in sulphur usage among these cooks was due to difference in absorption by the wood in the penetration period, although there was a small difference, in addition, of the equilibrium acid strengths between the two weaker acids. The almost uniform drop in bleach demands from 8.5 to 7.7 to 6.5% was again but a reflection of the increased chemical usage in proportion to increased initial acid strength.

It was interesting to compare the bleachability of the 8.07% acid cook of the 110 pound series with the 7.58 and the 8.78% acid cooks of the 95 pound series. The respective bleach demands were 8.5, 8.8, and 8.0%, in almost strictly inverse proportion to the initial acid strengths. However, the 110 pound cook had a total time 45 minutes shorter than the 95 pound cooks. This interlocking of the two series showed that the increase of 15 pounds pressure, when there was sufficient chemical in the digester, saved 45 minutes cooking time.

Pulp Yield and Screenings

In neither series did the screened pulp yield change. In one there was a variation of only 0.3%, in the other 0.5%, both within the limit of accuracy of the procedure. The yield remained constant in each series in spite of the fact that the bleach demand dropped 3% in one and 2% in the other. This behavior suggests that in the range of bleach demand covered here the attack on the carbohydrates was dominated by the time and temperature of the cook, and to a lesser extent by the degree to which the pulp was cooked.

Each series was made with a separate sample of wood, and the yields of the two were not strictly comparable with each other. With this reservation it may be pointed out that in the 110 pound series, cooked at the same temperature as the 95 pound series but 45 minutes less time, the yield averaged nearly 1% higher although the pulps are definitely

TABLE III.—PULP STRENGTH TESTS

A. Pressure 95 Pounds

Cook	6.06% SO_2	7.58% SO_2	8.78% SO_2
Busting strength, %			
Initial	63	60	58
At 400 ml. freeness	156	163	159
At maximum	164	165	167
Tearing resistance			
Initial	2.26	2.50	2.62
At 400 ml. freeness	1.32	1.11	1.02
At maximum burst	1.19	1.09	1.00

B. Pressure 110 Pounds

Cook	8.07% SO_2	9.95% SO_2	11.60% SO_2
Bursting strength, %			
Initial	75	72	75
At 400 ml. freeness	160	158	159
At maximum	162	160	164
Tearing resistance			
Initial	2.26	2.36	2.20
At 400 ml. freeness	1.09	1.26	1.16
At maximum burst	1.04	1.18	1.06

softer. In any event cooking to produce a softer pulp with high chemical concentration has had less harmful effect on yield than the same change in pulp hardness would have had if produced by an increase of temperature.

The percentage screenings was calculated on the basis of screened pulp as is general mill practice. In the 95 pound series the amounts were normal and showed no trend. In the 110 pound series the amounts are low possibly due to better penetration by the stronger acid.

Pulp Strength

In general it may be said that the pulp strengths of both series were normal for the conditions and for this species. The only unusual point was the uniformity throughout each series despite the drop in bleach demand. Here, again, is evidence of the milder action of cooking by chemical concentration than by heat.

Commercial Experience

There has been more than one confirmation of the above work on full mill scale operation. A typical example was as follows: It was necessary to shut down one digester for major repairs, but the normal production was badly needed. Cooking was speeded up to compensate for the loss of one digester. Most of the shells being fairly old, it seemed preferable to obtain this increase in rate with temperature rather than pressure. On two newer ones, however, an increase in cooking pressure from 80 to 90 pounds was allowed.

Data for these two digesters were analyzed separately for a month, and included 147 cooks. The first week was normal operation and constituted the control period. The following three were the periods of the test. As in all commercial operation there were seemingly inevitable variations, and it was necessary to set up a series of corrections. Total time saved was calculated as follows:

1. Any decrease in total time was taken directly and called positive.
2. From mill experience a change of 1% in chlorine bleach demand involves 25 minutes time. A decrease in bleach demand was taken as positive.
3. Any decrease in time to maximum temperature meant an increase in cooking at maximum temperature and was taken directly as a negative correction.
4. Any increase in maximum temperature shortened cooking time and was taken as a negative correction. From experimental work it was established that an increase of maximum temperature in the range of operating conditions decreased cooking time 2 minutes per degree Fahrenheit.
5. The algebraic sum of the above corrections was taken as the time saved by increase of digester pressure.

The mass of data was too great to include here. The time in minutes saved per cook for the various periods were:

Period	1	2	3	4
A	0	31	34	32
B	0	37	33	20

The uniformity of the savings added weight to the validity of the corrections. Digester A averaged a 32 minute per cook saving over a 3 weeks period. Digester B averaged a 30 minute saving, or an overall average of 31 minutes. The 45 minute saving from a 15 pound increase in pressure obtained from experimental work is in excellent agreement with the commercial findings.

It should be added that there was no appreciable change in pulp quality during the period described.

Conclusions

Pulping of wood is a chemical reaction subject to the basic laws of chemistry. From the Law of Mass Action it is known that the rate of a chemical reaction is proportional to the concentration of the reactants. Increase of the sulphur dioxide concentration in a digester at cooking temperature by using an initial acid sufficiently strong, and by increasing digester pressures, will increase the rate of the pulping reaction. Forcing the reaction with chemical appears to have far less effect on the product than temperature. Benefits of such procedure are, however, limited to the concentration that can be held by the pressure capabilities of the digester.

With the working pressures of digester shells limited to 100 pounds or less, the strength of acid which can be used efficiently appears to be limited, for 95 pounds pressure and 135° C. maximum temperature, to about 6.5% free SO_2. For higher pressures higher free SO_2 contents are feasible. When the free approaches 10% the benefits of penetration appear to increase more rapidly than at lower concentrations.

In the final analysis, increased digester pressure accompanied by acid of strength adequate to take advantage of the pressure gives the operator greatly increased flexibility of operation of his mill.

1. Production may be increased with no increase in temperature.
2. Production may be maintained with a decrease in temperature.
3. Softer pulp may be produced at the same temperature and production rate.
4. Any of the above may be combined in any desired proportions.

Literature Cited

1. Miller, R. N., and Swanson, W. H., "Chemistry of the Sulphite Process." New York, Lockwood, 1928.
2. Yorston, F. H., Studies in sulphite pulping. *Dept. Int. Canada, Forest Service—Bull.* 97 (1942).
3. McGovern, J. N., *Paper Trade J.* 103, No. 20; 29-42 (Nov. 12, 1936).
4. de Montigny, R., and Maas, O., Investigation of physico-chemical factors which influence sulphite cooking. *Dept. Int. Canada, Forest Service—Bull.* 87 (1935).
5. Palmrose, G. V., *Paper Trade J.* 100, No. 3; 38-9 (Jan. 7, 1935).
6. Haug, K. *Papir-J.* 22, No. 22; 252-5 (Dec. 15, 1934).

Applied Safety Engineering

The McGraw-Hill Book Company has recently published a book that should interest the executives and engineers of every industrial plant—the 189 page Applied Safety Engineering by H. Borman of the University of Maryland and H. W. McCrone, field engineer of the Baltimore Safety Council. It is dedicated to the safety engineer who labors with mind, hand and heart for his fellow man's welfare.

Management has felt the demands of the public for safe plants and many individuals have been directed to look after their plant's safety. The success has varied greatly because of inadequate training. Some know the "what" and "why" but do not always know the "how." Throughout this text emphasis is placed on the "how" of safety engineering. It tells how to get facts, action and interest, how to make investigations and how to handle accident cases. It also shows how to write safety rules and regulations, safety messages, how to hold conferences, how to make a safety talk and to make safety inspections.

Copies at $5.00 each may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 E. 42nd street, New York 17, N. Y.

TAPPI Notes

Jules J. Perot, Jr., formerly of the Rhinelander Paper Company is now in the Research and Development Division of the Socony-Vacuum Oil Company, Paulsboro, N. J.

Myron F. Flotow, formerly of the French Paper Company is now Asst. General Superintendent of the Allied Paper Mills, Kalamazoo, Mich.

Ted M. Danziger, formerly of the Institute of Paper Chemistry is now in the Chemical Warfare Service at Camp Sibert, Ala.

Edmund B. Taylor, formerly with the American Cyanamid and Chemical Company is now with the Stein Hall Manufacturing Company, Chicago, Ill., as a sales and service engineer.

The Kalamazoo Valley Section of TAPPI met at the Columbia Hotel, Kalamazoo, Mich., on April 6. George R. Sears of the Institute of Paper Chemistry talked on Water Vapor Permeability Testing Methods. His talk dealt with the comparative efficiency of the GFMVT cabinet and other techniques.

Kalamazoo GLAZED TILE

— The Finest Material for Paper Mill Needs —

Hundreds of paper mill executives and engineers know that Kalamazoo Tile construction costs less—lasts longer—controls stock better—requires less maintenance—and is more flexible as to size or design in meeting production layouts.

No other material equals the smooth, hard surface that is impervious to most chemicals—flushes clean—does not flake, pit or scale—and is free from friction.

Should fins—midfeathers—agitators—round—square or tapered ends, corners and bottoms be needed—the exclusive Kalamazoo method makes it easy to construct and moderate in cost, usually less than reinforced concrete.

Ask for engineering data.

Kalamazoo TANK & SILO CO.
KALAMAZOO · MICHIGAN

Since 1901

Dietz MACHINE WORKS
DIETZWORKS PHILA PA

MANUFACTURERS

TOILET ROLL CONVERTING MACHINES
TOWEL ROLL CONVERTERS
SPECIAL MACHINERY
ANILINE PRINTERS
TOWEL INTERFOLDING MACHINES
ROTARY CARD CUTTERS
SLITTERS FOR VULCANIZED FIBRE

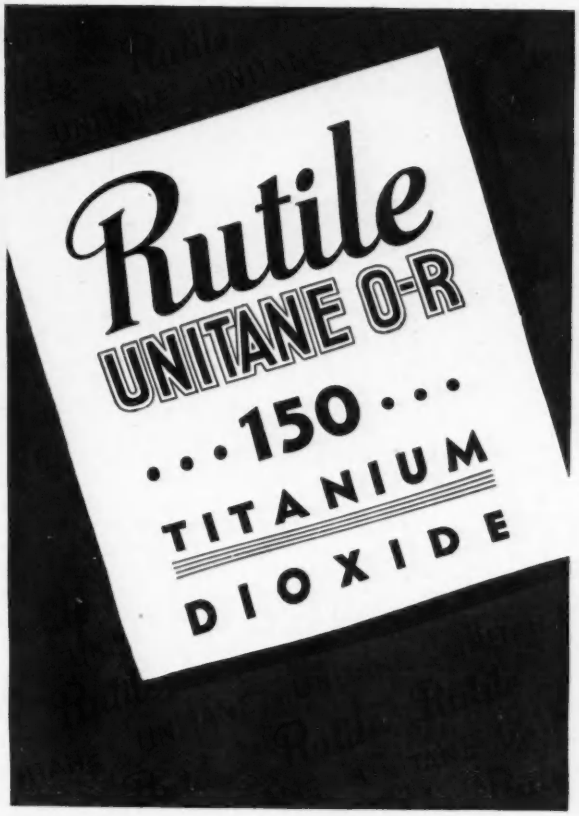
126 W. Fontaine St.
PHILADELPHIA 22, PA.

CLINTON

• QUALITY
• UNIFORMITY
• SERVICE

STARCHES
SPECIAL GRADES FOR BEATER, CALENDER AND TUB SIZING

CLINTON COMPANY CLINTON, IOWA



FOR MAXIMUM OPACITY . . .
HIGHER STRENGTH • ECONOMY

Suitable for ALL types of paper ranging from thin printing papers and waxing tissues to coated book and magazine stocks.

UNITANE O-R150 was especially developed for paper pigmentation. Its excellent dispersion in water promotes good retention and excellent sheet formation. As a component of the beater furnish, it produces whiter sheets of great brilliance, and superior printing qualities.

SAMPLES of UNITANE O-R150 will be sent promptly upon request.

UNITED COLOR and PIGMENT DEPARTMENT
CALCO CHEMICAL DIVISION
AMERICAN CYANAMID COMPANY
NEWARK, NEW JERSEY
Calco UNITED

New York Paper and Pulp Market Review

Paper Supply Situation Expected To Become Tighter For Civilians —Wood Pulp Production High But Consumption Exceeds Output— Waste Paper Collections Rising But Are Still Under Estimates.

Office of the PAPER TRADE JOURNAL.
Wednesday, April 19, 1944.

Relative high production with demand exceeding the ability of distributors to fill orders for paper and paper board, are indicated in current reports this week. Many reports received from manufacturers' representatives, jobbers, and general paper merchants, reflect concern at the tightening supply situation in general, and particularly at the serious trade supply situation in wrapping papers and in container board.

The situation in paper supplies is exteremely tight, states the Department of Commerce in its current industry report. The ability of the industry in general to meet war program requirements and essential civilian needs for paper and paper products, depends upon the success of the prisoner of war camps in the South and other sections of the country, and the availability of trucks and equipment. Manpower problems facing the pulp and paper industry are again intensified as a result of recent changes in Selective Service draft classification and related regulations. The plan to remove deferments from all men under 26 years of age, may seriously affect logging operations. It is also possible that inroads may be made upon some of the technicians and key men operating pulp and paper mills, the reports state.

The index of general business activity for the week ended April 8 declined to 143.8, from 144.2 for the previous week, compared with 139.1 for the corresponding week last year. The index of paper board production was 143.0, compared with 140.0 for the previous week, and with 151.5 for the corresponding week last year.

Paper production for the week ended April 8 was estimated at 92.0%, compared with 89.9% for 1943, with 98.9% for 1942, with 95.0% for 1941, and with 81.8% for the corresponding week for 1940.

Paper board production for the week ended April 8 was 94.0%, compared with 95.0% for 1943, with 93.0% for 1942, with 85.0% for 1941, and with 66.0% for the corresponding week for 1940.

Manufacturers' shipments of paper and allied products for February 1944, reached a new high record. The index for February was 169, compared with a previous high of 167 in October, 1943, and with a low of 138 for January, 1943. The index figure for all industries was 281; total durable goods, 388; and total non-durable goods, 197.

The index of the value of manufacturers' inventories in paper and allied products for February, 1944, was 133.6, compared with a low of 127.3 for November, 1943. The average index for 1943 was 109.2; for 1942, 134.7; for 1941, 110.7; and for 1940, 100.

Wood Pulp

Wood pulp production for February was 784,000 tons, or 3% less than the January output of 809,000 tons, and with 731,000 tons for February, 1943, the Department of Congress reports this week. Consumption exceeded new supply by 8,000 tons. At the end of February, inventories were 1% below the same month last year.

Rags

Demand for new cotton cuttings continues active. Mill buying is on a relative broad scale. All grades are in demand. Prices are strong and are maintained at full ceilings.

Trading in old cotton rags is active. Mills continue to buy about all the available supplies in the roofing grades. Prices are strong, with full ceilings being maintained.

Old Rope and Bagging

No change has occurred in the old rope market this week. Demand is steady and continues to absorb all supplies of Manila rope at the ceiling price. Demand for other hard fibers is active. Prices are firm.

Old Waste Paper

Mill demand for all grades of waste paper continues heavy and larger supplies are reported as urgently needed. The WPB reports that industry is doing a job equal to households in salvaging waste paper. Collections are being increased but are under estimates for the first quarter. The goal for 1944 is 8,000,000 tons, compared with mill receipts of 6,060,000 tons in 1943.

Twine

No important change in the twine market has been reported this week. Demand is active. Prices are firm. No change from the rigid allocation by use, has been reported and good grades of twine and cordage are strictly limited to important civilian uses.

Shartle Gets Third Army-Navy Award

For the third time Shartle Brothers Machine Company, Middletown, Ohio, has been honored by the government for quality and quantity of production as per schedules.

On April 6, 1943, it received the Army-Navy E; last fall a star was added. And now this progressive and "hard fighting" organization is again honored—with a second star.

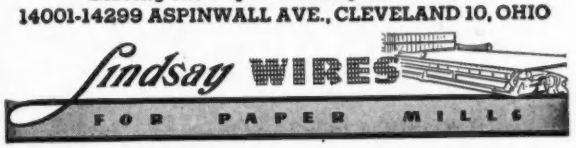
The management assures the Armed forces and the American people of their appreciation and pledges unto victory a continuation of their utmost effort.

Bitumastic Protective Coatings

Bitumastic protective coatings, processed from highly refined coal tar, are discussed in a folder issued by the Wailes Dove-Hermiston Corporation, Westfield, N. J. The folder is planned to aid in the solution of maintenance problems in the paper and pulp industry. It is stated that Bitumastic coatings give a high degree of protection against excessive moisture, condensation and exceptionally severe exposure to chemical fumes and other corrosive agents.

☆ Benjamin Franklin's curiosity about lightning and his development of a coal stove were typical of the Yankee spirit of ingenuity which has made America great. Call it research if you like. Lindsay desires by sincere effort to contribute materially to the improvement of Fourdrinier wire cloth and of the paper that is formed on it.

THE LINDSAY WIRE WEAVING COMPANY
Serving the Paper Industry Since 1903
14001-14299 ASPINWALL AVE., CLEVELAND 10, OHIO



HERMANN CLAFLIN REFINER FOR

Maximum Strength Development with Minimum Cutting. Develops High Mullen with High Tear and at High Freeness.

Special Hydrating Filling Particularly Advantageous for Kraft Pulps and Furnishes Requiring Long Beating.

Replaces Beaters and Jordans.

Due to Results Achieved with No. 2 Size Plans are being made for a Larger Size.

With Exception of Maintenance Parts and Repairs Our Plant Facilities are being used for Defense Products.

THE HERMANN MANUFACTURING CO.
LANCASTER, OHIO

Mapico Yellows

...give higher pigment value!

MAPICO YELLOWS

- –are pure, precipitated oxides of iron
- –are uniform in body and tone
- –have permanence unaffected by light, acids or alkalies
- –have good fiber adhesion
- –show low loss in wash water
- –minimize abrasion
- –are availbale in 5 standard shades from light to dark

One trial of Mapico YELLOWS will give ample evidence of their high tinting strength and economy. Technical inquiry is invited.

MAPICO Colors

ARMY E NAVY

PURE OXIDES OF IRON

YELLOWS
REDS
BROWNS
BLACKS

COLUMBIAN COLLOIDS

COLUMBIAN CARBON CO.
MAGNETIC PIGMENT DIVISION
MANUFACTURER
BINNEY & SMITH CO., *Distributor*
41 EAST 42nd STREET, NEW YORK 17, N. Y.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, April 19, 1944.

BLANCE FIXE—The market for blanc fixe continues to conform to prevailing quotations. Current demand fair. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton.

BLEACHING POWDER—Current demand is reported good. Supply situation reported satisfactory. Bleaching powder is currently quoted at from $2.50 to $3.10 per 100 pounds. All prices in car lots, in drums, f. o. b. works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f. o. b. shipping point. Imported casein 11¼ cents per pound, f. o. b. source.

CAUSTIC SODA—Supply situation continues rather tight, with production and demand reported heavy. Dry grades scarce. Solid caustic soda is currently quoted at $2.30 per 100 pounds. The flake and ground are currently quoted at $2.70 per 100 pounds. All prices in car lots, in drums, f. o. b. works.

CHINA CLAY—Demand for some grades of china clay is reported moderate this week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mines. Imported china clay is currently quoted at from $13 to $25 per long ton, ship side.

CHLORINE—No change in the market situation reported this week. Production and demand well balanced. Prices remain unchanged. Chlorine is quoted at $1.75 per 100 pounds, in single-unit tank cars, f. o. b. works.

ROSIN—Lower prices are quoted on some grades of rosin this week. "G" gum rosin is currently quoted at $4.69 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $4.70 per 100 pounds, in barrels, New York. Seventy per cent gum rosin is currently offered at $4.96 per 100 pounds, f. o. b. works.

SALT CAKE—Demand reported moderate. Quotations on salt cake continue to remain unchanged. Domestic salt cake is currently quoted at $15 per ton, in bulk. Chrome cake is currently quoted at $16 per ton.

SODA ASH—Market requirements for soda ash are reported as very heavy. Shipments improved. Prices continue unchanged. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Cash corn is reported coming into market in volume well below industrial needs. Market still tight. Quotations continue unchanged. Pearl is currently quoted at $3.72 per 100 pounds. The powdered grade is currently quoted at $3.83 per 100 pounds. All prices f. o. b. Chicago.

SULPHATE OF ALUMINA—Market situation is reported satisfactory. Quotations unchanged. Prices on the commercial grades are quoted at from $1.15 to $1.25 per 100 pounds. The iron free is currently quoted at $2.35 per 100 pounds. All prices in car lots, in bags, f. o. b. works.

SULPHUR—Demand is reported steady for sulphur. Quotations on all grades continue unchanged. Annual contracts are currently quoted at $16 per long ton, f. o. b. mines. The current contract price at Gulf Ports remains unchanged at $17.50 per long ton.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—			
Roll, contract	*$58.00	@	—
Sheets	64.00		—
* OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—
* OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.	5.75	"	6.00
Boards, per ton—			
News	*48.00	@	—
Chip	*48.00		—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10 @	$46.00	$40.25 @	$47.25
100% Rag	32.20 "	37.75	33.35 "	39.25
85% Rag	.... "	....	29.90 "	35.00
75% Rag	23.00 "	27.00	24.15 "	28.25
65% Rag	.. "	....	22.80 "	27.75
50% Rag	18.70 "	22.75	19.90 "	24.25
25% Rag	16.40 "	20.00	17.55 "	21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55 @	$12.75	$11.70 @	$14.25
No. 2	9.65 "	11.75	10.80 "	13.25
No. 3	9.20 "	11.25	10.35 "	12.50
No. 4	8.90 "	10.75	10.05 "	12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65 @	$15.5	
No. 2 Glossy Coated	12.40 "	14.0	
No. 3 Glossy Coated	11.60 "	13.2	
No. 4 Glossy Coated	11.15 "	12.7	
No. 1 Antique (watermarked)	10.25 "	11.7	
No. 2 Offset	9.60 "	11.00	
A Grade E. F.	9.35 "	10.7	
A Grade S. & S. C.	9.60 "	11.0	
B Grade E. F.	8.85 "	10.2	
B Grade S. & S. C.	9.10 "	10.5	
C Grade E. F.	8.55 "	9.7	
C Grade S. & S. C.	8.80 "	10.0	
D Grade E. F.	8.25 "	9.5	
D Grade S. & S. C.	8.50 "	9.7	

Ivory & India at $.50 cwt. extra

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight. Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$86.00
Unbl. Softwood Sulphite	74.00
Bl. Hardwood Sulphite	83.50
Unbl. Hardwood Sulphite	71.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich	72.00 @ 82.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate	82.00
S. Semi-Bleached Sulphate	75.00
N. Unbl. Sulphate	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	72.00
Unbl. Soda	68.00
Groundwood	50.00

Transportation Allowances Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50% 80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices

Domestic Rags

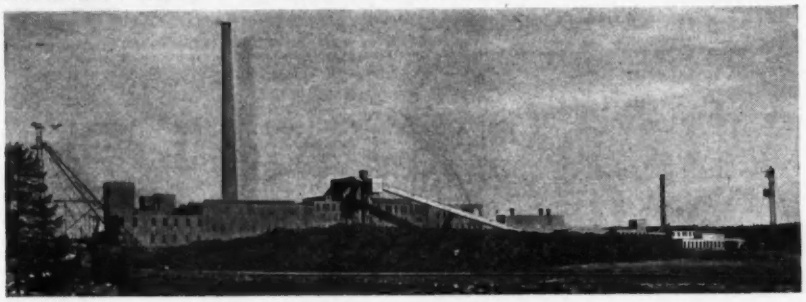
New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.00*

* OPA Maximum Prices.

PREPARE NOW FOR INCREASED KRAFT PULP PRODUCTION



OPERATING kraft mills under overloaded conditions for the past three or four years has resulted in abnormal corrosion in the recausticizing stations.

This equipment will require considerable replacement and enlargement as soon as materials are released for this use.

The Dorr Company has had wide experience in this field—it can survey your existing recausticizing system and help you work out plans for changes. See our latest flowsheet.

In the post war period, economic operation rather than quantity production regardless of cost will be the keynote. Process water treatment and the recovery of white water fiber and fillers will be in order.

A request to our nearest office will bring a Dorr Engineer to help you develop your plans.

DORR

RESEARCH — ENGINEERING — EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

DORRCO

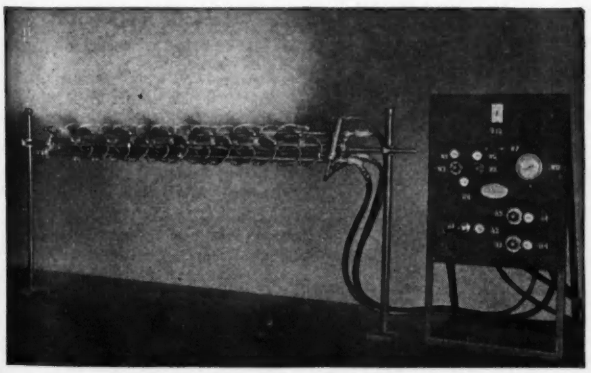
THE DORR COMPANY, ENGINEERS

NEW YORK 22, N. Y. 570 Lexington Ave. — CHICAGO 1, ILL. . . . 221 No. LaSalle St.
ATLANTA 3, GA. . . William-Oliver Bldg. — DENVER 2, COLO. . . . . Cooper Building
TORONTO 1, ONT. . 80 Richmond St. W. — LOS ANGELES 14, CAL. . 811 West 7th St.

RESEARCH AND TESTING LABORATORIES . . . . . WESTPORT, CONN.

SUGAR PROCESSING

PETREE & DORR DIVISION . . . . . 570 LEXINGTON AVE., NEW YORK 22



SPRACO BATTERY SPRAY MOISTENING EQUIPMENT

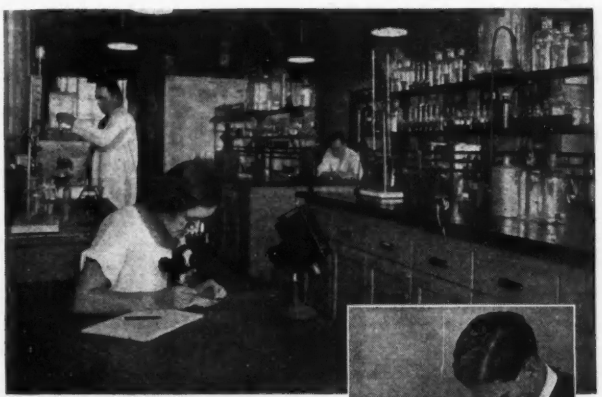
For the application of moisture in the form of coarse spray, fine spray or mist of uniform density across any desired width of web, with controls for varying the amount of moisture sprayed, at the same time maintaining uniform distribution.

Used extensively for the elimination of production difficulties due to uncontrolled moisture content. Improves finish, increases fibre strength and flexibility, eliminates static, prevents warp and waste. Each installation designed to meet operating requirements for any specified width, weight and speed of paper.

Write to

SPRAY ENGINEERING CO.

118 Central St. Somerville, Mass.



From Foods to Firearms

All along America's war production line, from its start with the raw materials in the field, through the laboratory to the final vital inspections, Bausch & Lomb Wide Field Stereoscopic Binocular Microscopes are at work.

They are helping in the quality control and processing of foods to feed the United Nations . . . in the manufacture and inspection of arms for all the forces of Freedom. They are in daily use in the field, in the laboratory and the shop. Filling the gap in magnification between the hand lens and the compound microscope, the Wide Field Binocular Microscope offers a three-dimensional view of the object under examination. The user sees the object under magnification, but with full perception of depth and perspective.

Like many other Bausch & Lomb instruments developed for the peacetime needs of education, research and industry, today the B&L Wide Field Binocular Microscope is serving America's wartime needs . . . taking a place beside the actual instruments of war which B&L manufactures.

Here again, because of its wartime accomplishments, Bausch & Lomb will be able to extend its optical services to peacetime pursuits when Victory is won.

B & L Wide Field Stereoscopic Binocular Microscope AKW

For Bausch & Lomb Instruments essential to Victory —priorities govern delivery schedules

BAUSCH & LOMB

Optical Co. • Rochester, N. Y.

ESTABLISHED 1853

An American Scientific Institution Producing Optical Glass and Instruments for Military Use, Education, Research, Industry and Eyesight Correction.

Old Rags

White, No. 1—
Repacked .....*3.80 "
Miscellaneous ....*3.20 "
White, No. 2—
Repacked .....*2.90 "
Miscellaneous ....*2.65 "
Third and Blues—
Repacked .....*2.20 "
Miscellaneous ....*1.80 "
Roofing Rags—
No. 1.....*1.55 "
No. 2.....*1.45 "
No. 3 (bagging)..*1.35 "
No. 4.....*1.35 "
No. 5A.....*1.35 "
Old Manila Rope.. 5.75 "

OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags

New Dark Cuttings.. 2.25 @ 2.40
New Mixed Cuttings. 2.00 " 2.20
New Light Silesias.. 5.50 " 5.75
Light Flannelettes... 5.50 " 5.75
New White Cuttings. 7.00 " 7.50
New Light Oxfords. 4.00 " 4.50
New Light Prints... 3.00 " 3.25

Old Rags

No. 1 White Linens. 7.50 " 8.50
No. 2 White Linens. 6.50 " 7.50
No. 3 White Linens. 4.50 " —
No. 4 White Linens. 2.25 " 2.25
No. 1 White Cotton. 4.25 " 4.75
No. 2 White Cotton. 3.25 " 3.75
No. 3 White Cotton. 2.50 " 3.00
No. 4 White Cotton. 1.90 " 2.20
Extra Light Prints.. 2.00 " 2.40
Ord. Light Prints... 1.75 " 2.15
Med. Light Prints... 1.55 " 1.95
Dutch Blue Cottons. 2.25 " 2.50
French Blue Linens. 3.00 " —
Checks and Blues... 2.00 " —
Linsey Garments.... 1.90 " 2.00
Dark Cottons..... 1.50 " 1.60
Old Shopperies..... 1.30 " 1.45
New Shopperies..... 1.45 " 1.50
French Blues..... 2.25 " 2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—
Foreign .....Nominal
Domestic ..... 4.25 @ 4.35
Wool Tares, light.... 4.25 " 4.50
Wool Tares heavy... 4.50 " 5.00
Bright Bagging..... 4.50 " 4.85
Manila Rope—
Foreign ..... — " —
Domestic .....*5.75 " —
Jute Threads..... 5.50 " —
No. 1 Sisal Strings..*4.00 " —
Mixed Strings..... 2.00 " —
* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)
OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut ..... 3.37½ @ —
No. 1 Hard White Envelope Cuts.... 3.12½" —
No. 1 Hard White Shavings, unruled. 2.87½" —
No. 1 Hard White Shavings, ruled... 2.50 " —
Soft White Shavings, one cut..... 2.87½" —
No. 1 Soft White Shavings ..... 2.50 " —
Soft White Shavings, Misc. ..... 2.15 " —
No. 1 Fly Leaf Shavings ..... 1.67½" —
No. 2 Fly Leaf Shavings ..... 1.12½" —
No. 1 Groundwood Fly Leaf Shavings 1.25 " —
No. 2 Mixed Groundwood Fly Leaf Shavings ..... .90 " —
Mixed Colored Shavings ..... .75 " —
Mixed Groundwood Colored Shavings.. .90 " —
Overissue Magazines ..... 1.67½" —
No. 1 Heavy Books & Magazines..... 1.67½" —
Mixed Books..... .85 " —
No. 1 White Ledger 2.17½" —
No. 2 Mixed Ledger, colored ..... 1.87½" —
New Manila Envelope Cuttings, one cut.. 2.87½" —
New Manila Envelope Cuttings ..... 2.65 " —
Extra Manilas..... 1.85 " —
Mixed Kraft, Env. & Bag Cuttings..... 2.75 " —
Kraft Envelope Cuttings ..... 3.25 " —
Triple Sorted, No. 1 Brown Soft Kraft. 2.50 " —
New 100% Kraft Corrugated Cuttings.. 2.25 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
New Jute Corrugated Cuttings ..... .90 " —
Old 100% Kraft Corrugated Containers 1.75 " —
Old Corrugated Containers ..... 1.15 " —
Box Board Cuttings. .72½" —
White Blank News.. 1.65 " —
Overissue News..... .85 " —
No. 1 News..... .75 " —
No. 1 Mixed Paper. .70 " —
Old Corrugated Containers ..... .82½" —
Mill Wrappers..... .85 " —

Twines

All Prices Nominal
(F. o. b. Mill)
(Soft Fiber)

Coarse Polished—
India ..... .21 @ —
White Hemp..... .21 " —
Fine Polished—
Fine India..... .26 " —
Unpolished—
Box ..... .17½" —
Paper Makers..... .17 " —
Tube Rope..... .19 " —
Wall Paper..... .20½" —
Wrapping ..... .23 " —
Soft Fiber Rope... .19 " —
Cotton ..... .25 " —
(Hard Fiber)
Medium Java..... .18 " —
Mex. Sisal..... .16 " —
Manila ..... — " —

PHILADELPHIA

Domestic Rags (New)

(Price to Mill.)

Shirt Cuttings—
New White No. 1..... .07¼
New White No. 2..... .05¾
Light Silesias..... .05¾
Black Silesias, soft..... .03½
New Unbleached ..... .07½
Washable Prints ..... .04¼
Washable No. 1..... .03
Blue Overall..... .05½
Cottons—According to grades—
Washable shredding ..... .01¾
Fancy Percales ..... .04¾
New Black Soft ..... .03¼
Khaki Cuttings—
Unbleachable Cotton Cuttings .03½
Bleachable Cotton Cuttings.. .04¼
Men's Corduroy ..... .03½
Ladies' Corduroy ..... .03
Cottonades ..... .03¼

Domestic Rags (Old)

White No. 1 — Repacked .... 3.80 "
Miscellaneous No. 1. 3.20 "
Miscellaneous No. 2. 2.65 "
White No. 2 — Repacked ..... 2.90 "
Thirds and Blues—
Miscellaneous .... 1.80 "
Repacked ..... 2.20 "
Black Stockings—
(Export) .....Nominal
Roofing Stock—
Foreign No. 1....Nominal
Domestic No. 1... 1.55 "
Domestic No. 2... 1.45 "
Roofing Bagging.. 1.35 "
Old Manila Rope... 5.75 "

Bagging

(F. o. b. Phila.)

Gunny No. 1—
Foreign .....Nominal
Domestic ..... 3.00 " 3.50*
No. 1 Clean bright—
Sisal Strings ..... .04
No. 2 Clean bright—
Sisal Strings ..... .03
Sisal Jute ..... .02½ " .02¾
Scrap—
No. 1..... .... 3.25 " 3.50
No. 2..... .... 1.75 " 1.90
Wool Tares ha ... 4.00 " 4.25
No. 1 New Light Burlap ..... 3.00 " 4.00
New Burlap Cuttings 3.75 " 4.00

Old Papers

(F. o. b. Phila)
OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut ..... 3.37½" —
No. 1 Hard White Shavings, unruled.. 2.87½" —
Soft White Shavings, one cut..... 2.50 " —
White Blank News.. 1.65 " —
Soft White Shavings, Misc. ..... 2.15 " —
No. 1 Fly Leaf Shavings ..... 1.67½" —
No. 2 Fly Leaf Shavings ..... 1.12½" —
No. 1 Groundwood Fly Leaf Shavings 1.25 " —
No. 2 Groundwood Fly Leaf Shavings .90 " —
Mixed Colored Shavings ..... .75 " —
New Manila Envelope Cuts, one cut..... 2.87½" —
Hard White Envelope Cuts, one cut..... 3.37½" —
Triple Sorted No. 1 Brown Soft Kraft. 2.50 " —
Mixed Kraft Env. & Bag Cuttings..... 2.75 " —
Kraft Envelope Cuttings ..... 3.25 " —
No. 1 Heavy Books & Magazines..... 1.67½" —
New Manila Envelope Cuts, one cut..... 2.87½" —
New Manila Envelope Cuttings ..... 2.65 " —
White Blank News.. 1.65 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
No. 1 Mixed Paper. .70 " —
Overissue News..... .85 " —
Box Board Cuttings. .72½" —
New Corrugated Cuttings, Kraft..... 2.25 " —
Old 100% Kraft Corrugated Containers 1.75 " —
Old Corrugated Containers ..... 1.15 " —
Jute Corrugated Cuttings ..... 1.07½" —

Bagging

(F. o. b. Boston)

Gunny Bagging—
Foreign .....(nominal)
Domestic ..... 3.25 @ —
Sisal Rope No. 1....*4.75 " —
Sisal Rope No. 2....*4.25 " —
Mixed Rope..... 2.00 " —
Transmission Rope—
Foreign .....(nominal)
Domestic ..... 2.75 " 3.00
Manila Rope—
Foreign .....(nominal)
Domestic ..... 5.75 " —
Soft Jute Rope..... 5.25 " —
Jute Cer ptThreads. 3.00 " 3.50
Bleachery Burlap.... 8.50 " 9.00
Scrap Burlap—
Foreign .....(nominal)
Domestic ..... 3.50 " —
Wool Tares—
Foreign .....(nominal)

BOSTON

Old Papers

(F. o. b. Boston)
OPA Maximum Prices

No. 1 Hard White Shavings, unruled. 2.87½ @ —
No. 1 Hard White Shavings, ruled... 2.50 " —
Soft White Shavings, Misc. ..... 2.15 " —
No. 1 Fly Leaf Shavings ..... 1.67½" —
No. 2 Fly Leaf Shavings ..... 1.12½" —
No. 1 Groundwood Fly Leaf Shavings 1.25 " —
No. 2 Groundwood Fly Leaf Shavings .90 " —
Mixed Colored Shavings ..... .75 " —
New Manila Envelope Cuts, one cut..... 2.87½" —
Hard White Envelope Cuts, one cut..... 3.37½" —
Triple Sorted No. 1 Brown Soft Kraft. 2.50 " —
Mixed Kraft Env. & Bag Cuttings..... 2.75 " —
Kraft Envelope Cuttings ..... 3.25 " —
No. 1 Heavy Books & Magazines..... 1.67½" —
New Manila Envelope Cuts, one cut..... 2.87½" —
New Manila Envelope Cuttings ..... 2.65 " —
White Blank News.. 1.65 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
No. 1 Mixed Paper. .70 " —
Overissue News..... .85 " —
Box Board Cuttings. .72½" —
New Corrugated Cuttings, Kraft..... 2.25 " —
Old 100% Kraft Corrugated Containers 1.75 " —
Old Corrugated Containers ..... 1.15 " —
Jute Corrugated Cuttings ..... 1.07½" —

Bagging

(F. o. b. Boston)

Gunny Bagging—
Foreign .....(nominal)
Domestic ..... 3.25 @ —
Sisal Rope No. 1....*4.75 " —
Sisal Rope No. 2....*4.25 " —
Mixed Rope..... 2.00 " —
Transmission Rope—
Foreign .....(nominal)
Domestic ..... 2.75 " 3.00
Manila Rope—
Foreign .....(nominal)
Domestic ..... 5.75 " —
Soft Jute Rope..... 5.25 " —
Jute Cer ptThreads. 3.00 " 3.50
Bleachery Burlap.... 8.50 " 9.00
Scrap Burlap—
Foreign .....(nominal)
Domestic ..... 3.50 " —
Wool Tares—
Foreign .....(nominal)
Domestic ..... 4.25 " —
Aust. Wool Pouches.. 3.75 " 4.00
New Burlap Cuttings 4.75 " 5.00
Heavy Baling Bagging 4.00 " 4.25
Paper Mill Bagging.. 2.50 " 3.00
No. 2 Roofing Bagging 1.35 " —
* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—
New Light Prints. .04½ @ .04¾
Fancy Percales.... .04¼" .05
New White No 1. .06¾" .07
New Light Flannelettes ..... .05½" .06
Canton Flannels, Bleached ..... .06 " .06½
Underwear Cutters, Bleached ..... .06¾" .06¾
Underwear Cutters, Unbleached ..... .05¾" .06
Silesias No. 1..... .06 " .06¼
New Black Silesias.. .03 " .03½
Red Cotton Cuttings .03½" .04
Soft Unbleached ... .06½" .06¾
Blue Cheviots .... .05½" .06
Fancy ..... .02¾" —
Washable ..... .02¾" —
Khaki Cuttings .... .02¾" .03
O. D. Khaki..... .03½" .03¾
Corduroy ..... .03¾" .03¾
New Canvas ..... .06½" .06¾
B. V. D. Cuttings... .06¾" .06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—
Repacked ..... 3.80 @ —*
Miscellaneous .... 3.20 " —*
White No. 2—
Miscellaneous .... 2.65 " —*
Twos and Blues, Repacked ..... 2.20 " —*
Old Blue Overalls... 2.25 " 2.30
Thirds and Blues, Repacked ..... 2.20 " —*
Miscellaneous ..... 1.80 " —*
Black Stockings .... 3.50 " 4.00
Roofing Stock—
No. 1 ..... 1.55 " —*
No. 2 ..... 1.45 " —*
No. 3 ..... 1.35 " —*
No. 4 ..... 1.35 " —*
No. 5, Quality A.. 1.35 " —*
Quality B.. 1.20 " —*
Quality C.. .95 " —*
* Old Manila Rope.. 5.75 " —
* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas .....(nominal)
Dark Cottons .....(nominal)
Dutch Blues .....(nominal)
New Checks and Blues..(nominal)
Old Fustians .....(nominal)
Old Linsey Garments....(nominal)
New Silesias .....(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)
OPA Maximum Prices.

Shavings—
No. 1 Hard White Envelope Cuts, one cut ..... 3.37½" —
No. 1 Hard White Shavings, unruled. 2.87½" —
No. 1 Soft White Shavings ..... 2.50 " —
Misc. ..... 2.15 " —
No. 1 White Ledger 2.17½" —
No. 2 Ledger, colored 1.87½" —
No. 1 Heavy Books & Magazines .... 1.67½" —
Overissue Magazines. 1.67½" —
New Manila Envelope Cuttings ..... 2.65 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
No. 1 Mixed Paper. .70 " —
Box Board Cuttings. .72½" —
Kraft Corrugated Cuttings ..... 2.25 " —
Old Corrugated Containers ..... 1.15 " —
Overissue News..... .85 " —
No. 1 News..... 1.00 " —
No. 1 White Ledger. 2.17½" —
No. 1 Heavy Books & Magazines ..... 1.67½" —
White Blank News.. 1.65 " —
Mixed Kraft Env. & Bag Cuttings... 2.75 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
Overissue News .... .85 " —
No. 1 News..... .75 " —
No. 1 Mixed Paper.. .70 " —
No. 1 Roofing Rags. 1.55 " —
No. 1 Roofing Bags. 1.45 " —